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Arab Regional Centre for the Transfer
and Development of Technology
27 February - 1 March 1978
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REVISED DRAFT FEASIBILITY STUDY

FOR

THE ARAB REGIONAL CENTRE FOR THE TRANSFER AND DEVELOPMENT OF TECHNOLOGY

78-1687

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THE ARAB REGIONAL CENTRE FOR THE TRANSFER AND DEVELOPMENT OF TECHNOLOGY [1]

1.0 Preface

Purposive activities towards the acquisition of science and technology are common occurrences in history. Since the early days of the nineteenth century one witnesses such efforts, often on a large scale, in Egypt and the Ottoman Empire, other efforts in this direction can also be noted elsewhere in the Arab world. In the post World War II period, the needs of developing countries for science and technology have received increasing attention. The UN system has committed itself to promoting the acquisition of science and technology on a steadily expanding scale. Technology transfer has been one of the concepts that has received substantial attention.

More specifically, one may trace the beginning of a UN substantive commitment in this direction to the UN Conference held in 1963 on the Application of Science and Technology for the benefit of the developing countries and to the UN General Assembly adoption in 1970 of the International Development Strategy for the Second United Nations Development Decade. This resolution called for the transfer of technology to less developed countries (LDC's) and the providing of assistance to LDC's to develop indigenous technology. A major step towards the realization of the concept was adopted at the third session of the United Nations Conference on Trade and Development (UNCTAD) in Santiago in April/May 1972. Resolution 32 (III) of this Conference was a starting point of a series of initiatives by institutions within the UN system. UNCTAD Resolution 87 (IV) and a number of field missions by UNCTAD staff went some way toward developing and exploring the original notions. The Regional Plan of Action for the Application of Science and Technology to Development in the Middle East[2] called for institutional developments for the transfer of science and technology.

1/ For the preparation of this feasibility study, Professor A.B. Zahlan, served as a Consultant to ECWA.

2/ ST/UNESOB/11 by the United Nations Economic and Social Office in Beirut, 1974, UN, New York.

A Conference on "Industrial Property and Transfer of Technology to Arab States" was held in Baghdad[1/] (March 5-10, 1977) to consider various aspects of technology transfer. The Economic Commission for Western Asia (ECWA) has also participated in this effort. In 1977 it published the report: Mechanisms for the Transfer and Development of Technology in the ECWA Region (E/ECWA/50, 22 March, 1977).

Progress has been made elsewhere toward pursuing the concept to its logical conclusion. The Economic and Social Commission for Asia and the Pacific (ESCAP) established the centre for the transfer of technology in June 1977. The Economic Commission for Africa (ECA) submitted its recommendations concerning the creation of such a centre in November 1977. In Latin America, SELA (Sistema Economico Latin Americano) initiated in March 1977 preparatory work to transform existing development centres into centres for the development and transfer of technology.

This draft feasibility study is a revised version of the study presented at the Second Interagency Meeting on the Arab Regional Centre for the Transfer and Development of Technology, 27 February - 1 March 1978. It benefited from discussions and comments presented at this Meeting; it also includes relevant information from the Working Paper.[2/]

2.0 ECWA's Programme and Plan of Action

On 29 April 1977 the Economic Commission for Western Asia adopted Resolution 51 (IV) to study the possibility of establishing a Centre for the Transfer and Development of Technology for all the Arab States in which ECWA's Secretariat was requested:

- to prepare and submit to the next session, in May 1978, a study on the possibility of establishing a Regional Centre for the Transfer and Development of Technology.

1/ The Conference was sponsored by the Industrial Development Centre for Arab States (IDCAS), UN Industrial Development Organization (UNIDO), The World Intellectual Property Organization (WIPO) and the Iraqi Ministry of Industry and Minerals.

2/ A Working Paper entitled: The Arab Centre for the Transfer and Development of Technology was prepared for submission to the First Preparatory Interagency Meeting; 36 pages, 6 October 1977, E/ECWA/NR/3. prepared by Prof. A.B. Zahlan, Consultant. Henceforth referred to as the Working Paper.

- to extend the coverage of the Centre to cover all Arab countries, and that the Centre serve the Arab countries as a whole. ECWA's Secretariat was asked to co-operate with ECI in order to cover the Arab countries in North Africa which are members of ECA;
- to co-operate with all relevant United Nations and regional organizations in implementing this study;
- to associate the governments concerned in the closest possible manner in the preparation of the required study.

ECWA gave special attention to the implementation of this study and, for a number of reasons, decided to make use of the services of a highly experienced consultant to assist in the execution of the project.

A Plan of Action for implementing this study was worked out, in co-operation with the Consultant. The first part was implemented as follows:-1/

ECWA held a preparatory interagency meeting in Beirut, between 24-26 October 1977, to which the Arab League Educational, Cultural and Scientific Organization (ALECSO), The Arab Labour Organization (ALO), The Arab Fund for Economic and Social Development (AFESD), Conference of Ministers of Arab States Responsible for the Application of Science and Technology to Development (CASTARAB), Council of Arab Economic Unity (CAEU), Industrial Development Centre for Arab States (IDCAS), The Abu Dhabi Fund for Arab Economic Development, The Arab League, The Iraqi Fund for External Economic Development, The Islamic Bank, The Kuwait Fund for Arab Economic Development, The United Nations Conference on Trade and Development (UNCTAD), The United Nations Educational, Scientific and Cultural Organization (UNESCO), The United Nations Industrial Development Organization (UNIDO), The Food and Agriculture Organization of the United Nations (FAO), International Labour Organization (ILO), and The World Intellectual Property Organization (WIPO), The Saudi Fund for Economic Development were invited.

The following organizations accepted the invitation and attended the meeting: ALECSO, ALO, CAEU, FAO, IDCAS, ILO, Kuwait Fund for Arab Economic Development, UNCTAD, UNESCO, UNIDO, and WIPO.

1/ The only change in the implementation of the Plan of Action was the use of two field missions instead of one.

The Consultant prepared a Working Paper for the October 24-28, 1977 preparatory interagency meeting entitled "The Arab Centre for the Transfer and Development of Technology".

The Working Paper contained a brief analysis of the various activities generally referred to by technology transfer (including transfer of tools, techniques and know-how) technology choice; measures and policies that influence these events, and a discussion of the various types and functions of a Technology Centre. The Paper also contained a sample set of questions to guide the mission planning to visit the Arab States. The design of these questions was based on both a detailed knowledge of practices in the region and the experience of similar missions elsewhere in the world.

The Consultant participated in the preparatory interagency meeting. By presenting the Working Paper, integrating new ideas and relevant comments in a revised document prepared towards the end of the meeting.

Discussion and amendments of the recommendations and views presented in the Working Paper are contained in the Report on the Preparatory Interagency Meeting on the Arab Centre for the Transfer and Development of Technology.[1/]

Two field missions then visited the member countries of the ECWA region as well as the Arab countries in North Africa who are members of ECA. A detailed summary of their findings is presented in this study. Arrangements were made with ECA to provide ECWA with the mission reports on the five Arab countries covered by the ECA study while ECWA will provide ECA with reports on the other Arab countries in North Africa covered by the field missions.

The two field missions began on 1 November 1977 and completed their tour by 20 December 1977. [2/]

1/ 23 pages; E/ECWA/TD/1, October 1977.

2/ See Briefing for Missions, 7 pages, E/ECWA/TD/6, October 1977.

The field missions consisted of experts from ECWA as well as other experts from any of the UN and other regional organizations and funds who were willing to participate in these field missions at their own expense.

The two field missions met with the Consultant in Beirut after terminating their visits to the Arab States. During this meeting, the mission findings were discussed and evaluated.

The Consultant then prepared and submitted by the end of January 1978 the draft feasibility report on the establishment of the Arab Regional Centre for the Transfer and Development of Technology. This report set forth the basic guidelines for the establishment of the Centre and contained recommendations concerning governance, management, staffing, budget, location, functions and services.

The second interagency meeting called for by ECWA met between 27 February and 1 March 1978 with the participation of 18 agencies, regional and national Arab organizations as in the first preparatory interagency meeting to discuss the draft feasibility report prepared by ECWA with the assistance of Professor Zahlan. After the meeting, the draft report was revised on the basis of discussions and recommendations in this meeting.

The following are the elements of the Plan of Action still to be implemented:

- An intergovernmental meeting, at senior experts level, will be held between 27 and 29 March 1978, to which all the Arab governments are invited to discuss the second draft report of the feasibility study. The Consultant will attend this meeting and prepare a second revised draft of the feasibility study on the basis of the deliberations of this meeting. He will review and submit a final feasibility study by 3 April 1978.
- The feasibility study will then be submitted for discussion and approval to ECWA's fifth session between 2 and 7 May 1978. The Consultant will, if necessary, revise the feasibility study on the basis of the deliberations of the session, and submit it in a final form within one week after the closure of the session.
- Provided the feasibility study is approved by the session, ECWA will then invite the pledging Arab governments and regional institutions to a meeting to establish the Centre.

- Apart from and along with the early phase of this Plan of Action, ECWA is to make certain contacts at the highest levels with the governments and regional institutions concerned to obtain some initial comitments from them for the financing of the Centre once it is approved.

2.0 Background Information

The need to acquire, transfer, absorb, develop, diffuse and adapt technology goes back in some Arab States to the early years of the nineteenth century. Muhammad Ali in Egypt, Amir Abdel Kader in Algeria, the Porte in Istanbul and Sultan Sa'id of Oman were all engaged in various ways and on different scales in the process of technical change. Muhammad Ali's efforts were on a large scale, involving thousands of foreign technicians, the use of foreign study and travel to Europe by Egyptians. Educational and training institutions were established, new agricultural methods were adopted; extensive irrigation projects were undertaken. But these promising beginnings were either stopped or severely curtailed by the wave of European imperial interests that overrode most of the Arab world shortly thereafter; by the early part of the twentieth century, most of the Arab world was under the occupation, military, naval or otherwise, of Britain, France and Italy. Each country pursued a developmental path dictated by the colonial power dominating it, and the economy of each state became gradually integrated into the economy of a foreign power.

During the post World War II period, the Arab States, except for Palestine, secured their independence. The liberation from direct military and political domination was followed by the desire to seek the liberation of national resources still entangled with foreign powers. It was the nationalization of the Suez Canal in 1956 and the subsequent nationalization of petroleum resources that gave the national governments control over their resources.

During their immediate post-independence period, most Arab countries favored governmental control for development. Although considerable technical, educational and economic change took place, they were generally on a modest scale, affecting only a minor portion of the population. Furthermore, their respective economies were delimiting factors in the developmental process. With the increased oil revenues of the past decade, however, most Arab States now generate adequate financial resources for self development. In addition, a number of Arab development funds have been established either by a single Arab State (e.g. Kuwait Fund for Arab Economic Development) or collectively by several states (e.g. Arab Fund for Economic

3.1 Organization of the Report

In order to present a coherent and concise analysis of the justification of the need for and the feasibility of establishing the proposed Centre, the results of the studies findings is presented in appendix I of the report.

3.2 Arab Transactions in Technology

High Dam, the Greater Mussayab Project, dams in Iraq or Algeria, the Haradh agricultural scheme in Saudi Arabia, the new Saudi Arabian Eastern industrial complex, to airports, airlines, airforces, new schools and housing projects.

For the sake of precision and illustration a brief review of the behaviour of Arab States in the petroleum and petrochemical fields will be presented.[1/]

A study of the petroleum and petrochemical sectors in the Arab world during the period since 1959 shows that more than 600 large and small projects were executed in the Arab world. Table 1 shows their distribution throughout the Arab States. Amongst these projects one finds: urea (25) ammonia (30), nitric acid (9), refining (34), LNG (18), polyethylene (7), catalytic reformer (20), LPG (22), atmospheric distillation (13), vacuum distillation (13), crude distillation (19), etc. These projects were designed by 83 different firms: 17 of these designed 67% of the projects; 14 other firms designed 16%, and 52 (an average of 2 projects per firm) designed 17%. In a substantial number of cases the engineering and construction of the plant were undertaken by the same firm. But in more than 95% of cases the projects were fully planned and executed by international firms in a technology-free transfer process.

Although investment in oil refineries, petrochemicals and fertilizer plants and gas facilities during the 1975-1980 period in the Arab world is estimated at $67 billion, the quantities of chemicals that will reach Europe from the Middle East manufacturing centres by 1985 will be slight and even by 1990 they will be below 10% of the market. [2/]

Another aspect of petroleum and petrochemical projects now underway in several Arab states is their high costs. It is estimated that plants cost 50% to

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[1/] For more details, see A.B. Zahlan, "Established Patterns of Technology Acquisition in the Arab world", in ECWA Seminar on Technology Transfer and Change in the Arab World, A.B. Zahlan (editor), Pergamon, London (1978).

[2/] Martin Quinlan, "Markets for Middle East Producers", Petroleum Economist, April, 1977, p. 125.

...

100% more than if they were to be executed in Europe or in U.S. The elevated prices are due to the need to import labour, supplies and equipment and the generally weak technological and industrial base of these countries.[1/] These amazingly high costs could only be brought down by extensive programmes to develop manpower and the industrial base.

A second related activity, pipelines and gas collections, is also on a large and gigantic scale. The overall expenditure of Algeria on pipelines and cryogenic facilities for LNG will exceed $21 billion by 1985.[2/] The Saudi gas collection project is expected to cost $ 16 billion. This project alone calls for some 20 million tons of steel; these are scheduled to be delivered at the rate of 28,000 tons daily for a period of two years. The scheme involves some 800 miles of 16 to 48 inch diameter tubing.[3/]

Numerous other examples may be presented such as Sumed, The Dhahran/Ras Tanura pipeline and gas collection, storage and gas liquification in several Arab States. The annual rate of expenditure on this aspect of the petroleum industry is probably in the range of $ 10 billion.

At this point, it must be emphasized that the pattern through which the petroleum petrochemical and other industrial projects are executed bears no relation to the transfer of technology, local procurement and employment. It is, for example, estimated that the current projects in petroleum gas collection and pipelines will require some 40 to 50 million tons of steel over a three-year period. The production of this steel and its manufacturing into tubing and other components should create some 6 to 7 million man-years of employment.

In a study of the records of the (U.K.) Association of Consulting Engineers (A.C.E.) shows that during the period 1950 to 1976 the value of contracts in the hands of A.C.E. members increased from £41 million (1953) to £4,400 million (1976). This represents a 100-fold increase.[4/] These figures refer to the cost of the projects to the Arab States and not to the receipts to the British economy. Some of the projects are designed by British firms and executed by non-British contractors.

1/ David M. Wallace, "Saudi Arabia building costs", Hydrocarbon Processing, March 1976, pp. 189-196.

2/ Margaret Greenhalgh "Debts mount as doubts arise over long-term LNG markets", MEED, Vol. 13, pp. 55-6, 1977.

3/ Bart Collins, Middle East plans are geared to big budgets, high prices", The Oil and Gas Journal, pp. 77-101, July 19, 1976.

4/ A comprehensive study of the history of civil engineering projects in the Arab World since 1800 is presented in A.B. Zahlan, History of Technology in the Arab World since 1800, (forthcoming). See also, A.B. Zahlan, "The Technological Dimension of Arab Economic Integration" in Strategy for Arab Economic Integration, Burhan Dajani et.al. A Study for the Arab League, 1976. [illegible] Zahlan/Arab League

The fraction of the cost spent in the contracting country varies enormously from project to project. For example, in projects involving considerable equipment and supplies other than stone, sand and cement much of the cost is spent abroad.

Civil engineering accounts for a large fraction of A.C.E.'s projects. Airport, drainage, sewerage, refuse disposal, harbours, docks, sea defence works, irrigation, land planning and development, roads, bridges and tunnels added up to $3,234 million (some $16 billion) in 1976. Most, if not all, of this type of work is classical and based on textbooks principles and slowly changing technologies.

These figures of A.C.E. exclude the considerable number of military projects - harbours, airports, bases, hospitals, etc. The cost for these projects is generally not known. It is suspected that the volume of expenditure on these activities is considerable and certainly a multi-billion dollar business.

It is possible to combine a large variety of fragmentary information on the Arab States that would place the total volume of new contracts negotiated annually at roughly $ 30 billion and the total value of contracts under execution at about $ 100 billion. These figures imply that A.C.E. secures one third of all Arab international contracts. Since these figures exclude military contracts and are based on reasonably accurate records, the actual figures must be substantially greater. It is possible also to estimate the number of contracts negotiated annually in engineering and contracting. With the A.C.E. records as a basis, one may place the number of new contracts signed annualy in the range of 2000 to 4000. The total number of on-going contracts is probably in the range of 6000.

When one remembers the total dependence of the Arab world on foreign sources for its defense equipment (some $ 10 billion annually) and the fact that some 50% of Arab food supplies are imported, the volume of transaction in technology products and supplies is considerable. Of course, all numbers are only approximate, but the important point here is to acquire an understanding of the scale of these transactions and the implications of such patterns.

In order to give perspective to the discussion, it may be worthwhile to note that in its fourth Five Year Plan (1972-1976), the People's Republic of China spent $ 2 billion on complete plants and some $ 2 billion on large equipment [1] or, less than $ 1 billion per year, or $ 1 per capita per year. By contrast, the Arab world equipment imports is about $ 250 per capita per year.

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[1] Science and Technology in the People's Republic of China, O.E.C.D., Paris, 1977, p. 45.

Number of new projects each year cited by Hydrocarbon Processing[1]

Year	Egypt	Alger.	Iraq	Jdn	Kwt	Lbn	Libya	Mtnia	Morocco	UAE	Qatar	Saudi Arabia	Sudan	Syria	Tunisia	Total
1976	6	11	12	2	8				7	4	2	14		4		70
1975	13	24	5	1	4		19	2	4		6	17		4		99
1974	2	11	1	9	6		13	1	1	2	1	3	2		1	53
1973	4	14	1	2					4	10		1	1		1	38
1972	2	6	3	3	1	1	8			2	1	4		1		32
1971	23	6			3		2		6	2						42
1970	1	5	4	1	3	4	3		2			24		1	1	52
1969	4	2		3	2		5		1		2			5		24
1968			1		1							1				3
1967	17	4	2		17		3		1			5		1		50
1966	6	2	6		1	7	6		1	1		3		1		34
1965	6		1			1						3			5	16
1964	5	3	1		14	6	1					1				31
1963	9	7	2		2		1					1			1	23
1959	9		5									2		1		17
	107	98	44	21	62	19	61	3	27	21	12	79	3	18	9	Grand Total 584

1/ Each number represents a different entry in the annual index of Hydrocarbon Processing. The data for the years 1960-1962 is very incomplete, hence no entry for those years in table. The entries refer to a wide variation in type and size of plants.

If one compares the volume of engineering contracts in the Arab world with corresponding economic activity in the U.K. and the U.S., one finds that the value of the activities in the Arab States is greater than in the U.K. and less than in the U.S. [1/] Thus, Arab international transactions are comparable with the scale of economic activity in major industrial powers.

What is particularly striking in the Arab pattern of international contracting in the civil engineering sector (as indicated briefly above vis-a-vis Arab A.C.E. contracts) is the fact that the bulk of the projects are in areas of long established technology. It must have been evident in 1958 or 1958 that the need of the Arab States for this type of engineering was enormous and continuing. Yet there is no evidence that any effective measures were taken to train and equip Arab institutions and manpower to cope with a demand that was growing at a fairly high rate.

Some of the projects in the Arab world are among the largest in the world, yet they will generate little employment for Arab manpower. Arab States seek to import "advanced technology" - plants considered in the West as utilizing recent technical findings - yet many of these plants are operated far below their design capacity.

Most major industrial installations in the Arab world are conceived and constructed by foreign firms as foreign enclaves. Few of these installations have developed forward and backward linkages with other industrial and economic activity. The specific Arab State, or the Arab world as a whole does not therefore acquire appreciable know-how when a contract is completed: the maintenance, modernization, or duplication of the installation often calls for new contracts with international firms. Thus one finds foreign firms are modernizing the telephone system in Cairo and the airport of Jeddah. All of this is very surprising for a number of reasons. The telegraph was brought into the Middle East more than 130 years ago, telephones have been around for more than 50 years and the science of civil engineering has been in use in the region for some 5,000 years. Furthermore, in the past three decades a large number (possibly 100,000) of trained engineers have graduated from Arab universities and there is a substantial tradition in public and private consulting and contracting firms. Yet the volume of foreign contracts in these domains has increased some 100-fold in the past 20 years. What are the reasons behind this prolonged dependence on foreign firms? What are the appropriate and relevant policies to be pursued to alter this dependence?

[1/] Zahlan/Arab League, op.cit.

The pattern utilized to execute these projects involves financial cost and loss of employment opportunities. All these projects involve huge supplies of materials (iron, steel, cement...) and equipment (distillation towers, valves, pumps...). The production of the materials, supplies and equipment for the petroleum and petrochemical projects in progress created jobs for millions of workers in advanced countries. The loss of employment generated by current food imports have incalculable manpower and unemployment implications. Of course, the Arab States - singly and collectively - cannot instantly alter this state of affairs. But, a great deal can be done within as short a period as 3 to 5 years.

Suitable models for the design of new engineering contracts with a view to the transfer of specific technologies to Arab States and institutions should be designed. It is possible to design these contracts so that they will burden neither the contractor nor the beneficiary. A contract may have bilateral and multilateral dimensions. For example, a contract for the construction of one or more dams in Iraq may have clauses on the transfer of certain civil engineering technologies to Iraq and other clauses re transfers to institutions in Lebanon, Egypt and Algeria. Naturally the entire project has to be conducted on a business basis and has to meet the standards normally expected in such an enterprise. One must hasten to add that in most large contracts the prime contractor has to manage a large number of sub-contractors. Thus designing contracts that will give priority to national and Arab sub-contractors will not necessarily become an added burden on the prime contractor. Needless to say, the contract design has to be carefully undertaken and the prime contractor should not be expected to create new sub-contractors. This condition implies careful and comprehensive technological surveys that will provide the necessary information to the policy maker and the contractors. Arab States wishing to secure larger shares of such sub-contracts may do so by promoting and developing the relevant national institutions.

Another extremely important issue is the cost and pricing of contracts. There is considerable evidence to indicate that the cost of projects executed in the Arab world may be as much as three times higher than the cost of similar projects executed elsewhere. Very fragmentary information is available about the cost structure and the factors contributing to these high costs. Frequently, the operating cost of plants, and thus the unit production cost, is also high. [1/]

[1/] See, for example, Omar Grine "Transfer of Technology in the Arab Steel Industry" in ECWA Seminar on Technology Transfer and Change in the Arab World, A.B. Zahlan (ed), Pergamon Press, London (1978). Also, David H. Wallace, "Saudi Arabian Building Costs", Hydrocarbon Processing, November, 1976, pp. 189-196.

Naturally, industrialization cannot be said to occur when the transfer of capital goods is technology-free, when the cost of the installation is higher than the cost of similar plants elsewhere and finally when the plants are operating at a loss and far below capacity. This, for example, is the case of the fertilizer industry in the Arab world. A recent IDCAS study found that these installations, except, for Kuwait were operating far below capacity and at a loss.

TABLE 2

Operating Efficiency of Arab Nitrogen Fertilizer Plants

Country	Operating level as per cent of capacity		
	1974	1975	1976
Algeria	8	8	8
Saudi Arabia	49	61	63
Syria	56	59	57
Iraq	59	50	54
Qatar	37	41	52
Kuwait	84	86	83
Egypt	65	69	78

Table 1 in ٦ / ج/أ/٢/ص، p.9, in "Arab Co-operation in the development of the Arab chemical fertilizer industry", an IDCAS working paper presented at the Second Meeting of the Arab Ministers of Industry, Tunis, 8-10 November 1977.

So far, the emphasis of the discussion has been placed on the scale and nature of the international transactions in the field of engineering and contracting. But, one could also examine events and processes in which the element of development is of greater importance than that of transfer. Two of many such examples will be mentioned.

There already exists a large variety of technologies in the region, much of these have originated in the area, while other are of more recent acquisition. Yet the geographical diffusion of these technologies within the same country or throughout the region is slow.

The study of the impact of economic or technological changes on technologies in use or being acquired should also be the subject of careful study. For example, the recent increase in the cost of energy had dramatic effects on the cost of agricultural products. The mechanization of agriculture and the intensive use of fertilizer are energy dependent: in some advanced countries 5 calories of

energy are expended per caloric of food produced. Furthermore, there is considerable difference in the "petroleum" energy ratio (E_R = (Energy Out)/ (Energy In)) of different food products and different styles of agriculture. The energy ratio for cassava is 60 to 70; for potatoes, barley, wheat, maize and sugar beet, it is 1 to 4 for US and UK production; for 1963 UK agriculture it was 0.35; for UK broiler poultry it is 0.1; and for various fishing fleets it is 0.01 to 0.05. 1/

If one were to examine agricultural output per total energy input (inclusive of the food requirements of the farmer), the use of dung as a fertilizer, etc., one would find US/UK agriculture to have low energy productivity while Japanese and traditional forms exhibit a better energy performance. All Arab States today are endeavouring to transform their agricultural sector and thus it would be of vital importance to plan this agricultural strategy in the light of expected energy cost in years 2000 - 2050. Naturally, this is only one of the factors that has technology impact; others such as land and population are also relevant in these technology choices.

4.0 Institutional infrastructure in the Arab world.

The 21 Arab States exhibit a large variety of social and economic conditions. Yet in all of them there exists tendencies towards central development planning. In some, such as Egypt and Iraq, the exercise of development planning is more than twenty years old while in others it has yet to take a mature form. Governments generally pursue three broad economic objectives: diversification of the economy, the rational exploitation of the national natural resources, and raising productivity levels. The attainment of these objectives calls for greater attention being given to the technological dimension of policies and to the national instruments for pursuing the objective.

In a recent ECWA publication, considerable attention was focused on the limited capacity of the Arab States in Western Asia to engage in the development and adaptation of technology. 2/ Considerable evidence was presented in support of this conclusion. Briefly these limitations were manifested in the near total absence of R&D efforts devoted to technology, the few national consultancy firms dealing with technology analysis, identification, adaptation and development. Except for Egypt, similar conditions prevail throughout the Arab States of North Africa. Although in Egypt activities in these fields are more extensive than elsewhere in the Arab

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1/ G. Leach, Energy and Food Production, International Institute for Environment and Development, Washington, 1975.

2/ The Status of Science and Technology in the Western Asia Region, prepared by ECWA HRST Division, 89p., E/ECWA/NR/SEM.1/18, September 1977. To appear in ECWA Seminar on Technology Transfer in the Arab Middle East, op.cit.

world they still fall short of meeting national needs. The mounting and large-scale dependence on international contracting is, of course, another manifestation of this phenomenon.

The average expenditure on R&D in the Arab world is one of the lowest in the world and is barely 50% of the Third World average of $ 2/capita-year. 1/ Although one does find variations from one Arab State to another the effort is very limited. Around 300 to 500 R&D units already exist throughout the Arab world. Few are as large as the National Research Centre in Cairo. Many are very small units attached to ministries. On the whole some R&D infrastructure already exists although it requires considerable development and expansion.

No Arab State has so far undertaken to establish a national centre for the planning or management of technology policies. Few Arab States possess a capacity for the monitoring of the licences they are party to. Consequently no reliable information is available on fees and royalties paid by Arab States or information on the legal status of these licences.

The preparation of projects for both national and international contracting rarely gives due attention to the technological dimension. Few of the R&D institutions are concerned with this aspect. Furthermore, most large projects are executed through the turn-key formula and rarely involve national institutions in the design or planning phases.

Several Arab States are currently attempting to create national committees and or centres for the transfer and development of technology.

In the domain of manpower and training one observes a constant expansion in the scale and allocations at all levels of the educational system in virtually all the Arab States. However, limited attention has so far been given to the training and development of the highly specialized manpower required to plan, design and execute the type of projects the Arab States are committed to. Some Arab States are able to provide the skilled manpower required to operate the new facilities once established, while others depend to a considerable extent on expatriate manpower. No Arab State, is capable of providing the full technical services to maintain and develop its telecommunication system, its hotel industry, its railways and road systems, airports, harbours or industries. The development of technical education has been receiving increasing attention. But it is doubtful whether the efforts being made are commensurate with national or regional manpower requirements. Thus the continued dependence on foreign expertise is a consequence of a lack of appropriate institutions.

1/ The estimate is based on statistics published by UNESCO. For the Arab States, the CASTARAB figures have been used.

Continued brain drain from the Arab world to Europe and the U.S.A. is a result of institutional underdevelopment. Much of the technical manpower shortages could probably be alleviated if the region were to possess an institutional capacity to plan training programmes on the scale and quality needed. There is a vicious cycle: institutional limitations sustain technical manpower shortages and limit national capacity for technical planning, engineering design and construction; the latter limitation leads to extensive dependence on international contracting; this dependence on international contracting bypasses national institutions and stunts their growth which in turn result in a brain drain. Opportunities for interrupting this process exist and the proposed regional Centre shall bring such possibilities to the attention of the Arab States.

In the field of information two ECWA studies 1/ & 2/ have explained the limitations of the existing systems. Attempts to overcome these informational constraints are being made; but again the current efforts are not matching the requirements of the development plans and projects in the region. One finds that few national institutions utilize the available international and foreign sources of information.

Traditional technologies generally receive marginal, if any, attention. Traditional modes of transport, construction, agriculture, health services, marketing and storage, can all be improved with modest resources. The majority of Arab society utilizes and will continue to utilize traditional technologies for decades to come. Thus it is most important that technological problems of the traditional sector be attended to.

1/ Draft Feasibility Report on establishing a Regional Documentation Centre at ECWA for the Economic and Social services, unpublished document prepared by ECWA, November 1975.

2/ A study and assessment of information resources in selected Developing countries of the ECWA region (E/ECWA/NR/2), prepared by the Natural Resources Science and Technology Division of ECWA.

5.0 Assessment of the need for an Arab Regional Centre for the Transfer and Development of Technology

In section 3.0 it was shown that the Arab States are securing the services of international firms for the execution of projects on a very large scale. It was estimated that the civilian portion of these projects amounts to an expenditure of some $30 billion annually and a current commitment of some $100 billion. It was also noted that the cost of projects is fairly high and the extent to which these projects are integrated in the national economies is also very limited. In fact, most projects persist as isolated enclaves. The performance of many of them after completion is often below expectation.

It is thus obvious that the Arab States have expressed a need and a demand for technical services. However, in order for the Arab States to derive greater benefit from these expenditures they will need to develop additional institutions, policies and manpower to plan and manage these processes. The institutional arrangement for achieving this objective has been called a centre for the transfer and development of technology. Most Arab States are engaged in developing their national capacity in this direction. The UNCTAD recommendation which was adopted by ECWA calls for the establishment of a regional centre for the transfer and development of technology. This regional centre is to assist the individual states in coping with the problems associated with technology and the development of national centres.

In order to design a centre that is appropriate to the needs of the Arab region ECWA called for the two interagency meetings at which various options and possibilities were carefully discussed and examined. ECWA also organized two field missions that visited 20 Arab States and discussed the concept and national requirements with more than 200 officials. A full report on the field missions is included as Appendix I. The extensive discussions and consultations naturally led to the development of the concept as reflected in this study.

At the outset of this ECWA programme, it was fully realized that the needs and demands for services in the technological field in the Arab world were enormous. It was also realised that to supply all of them was beyond the possibilities of the proposed Centre. Thus the objective of the missions was to contribute to the narrowing of the range of functions of the proposed Centre.

Most government officials interviewed by the missions were generally in favour of the establishment of an Arab Regional Centre for the Transfer and Development of Technology. Their support was usually conditional on the possibility of creating a centre capable of providing effective and useful assistance. There was considerable emphasis on the following functions: policy design, training, comprehensive information services, co-ordination and appropriate technology. The expressed demands of all parties were fully analyzed and the institutional requirements to respond to these demands were computed. The size of the required Centre to cope with the requests was considerably greater than the size originally envisaged in the Working Paper. For this reason, two levels of activities are represented: a minimal size below which it is impossible to fulfil the desired functions and a level at which the Centre may be able to provide basic services to most, if not all, Arab States. The larger size would still fall short of the expressed demands. A detailed discussion of this point is presented in Section 6.0.

It is important here to note that although Third World countries have much in common, they also have much that is different. The strategic location, the immense natural resources, the low density of population, the high rate of population growth, the availability of considerable foreign exchange, the high volume of foreign imports of consumer and industrial products, the large diversity of social and economic systems, the existence of a number of regional institutions, the increasing rate of population mobility, the high dependence on food imports, the large and increasing migration of workers and the brain drain are striking characteristics of the Arab region. No other region combines the same factors in this same intensity. Any comparison between the Arab world and other regions of the world should be made with care.

The regional character of the proposed Centre is justified by the following facts:

5.1 Collective and individual experiences: The same technologies are sought by different Arab States. If carefully studied and properly analyzed, these diverse experiences are of direct relevance to all Arab States. The regional centre by focusing on the experiences of the entire region places at the disposal of each Arab State a valuable body of knowledge.

5.2 Regional solution to national problems: A large number of technologies require highly specialized manpower and institutions. Though the national markets may not be adequate to sustain such institutions, the total Arab market for the services of such institutions is more than adequate. A regional Centre provides the necessary perspective to examine such areas of technology.

5.3 The diffusion and dissemination of existing relevant technologies: A number of Arab States have successfully acquired and/or developed a large number of technologies. Many are needed in other Arab States. A regional Centre emphasizes the opportunities for internal transfers within and between Arab States.

5.4 The complementary nature of Arab economies: The economies of the Arab States have considerable potential for integration through their complementary characteristics. A regional Centre emphasizes these qualities and may contribute to their development.

5.5 The development of similar national institutions in the technical field: All Arab States during the following two decades aim to develop appropriate national institutions for technological planning, management, research and development. Thus at different periods of time each State may require advisory services in these fields. In providing these advisory services a regional Centre accumulates and develops its expertise to the benefit of the Arab world.

5.6 The preparation and diffusion of information on Arab R&D and related institutions: So far, the available information on national and regional institutions engaged in R&D and in technological transaction is very limited. This scarcity of information limits opportunities for co-operation between these institutions. A regional Centre should be able to provide factual, comprehensive and comparative studies of institutions, programmes and projects. Such studies should contribute to the increase of co-operative work and establish yardsticks by which to measure performance and identify bottlenecks and promising solutions.

5.7 Design factors and limitations:

Because there already exist a large number of national and regional programmes and institutions, the design of the Centre had to be carefully formulated to avoid duplication, needless competition and friction. For

this reason the proposed Centre has been designed to take into consideration past experience, to concentrate on relatively narrow and poorly served areas as well as to co-operate and co-ordinate its activities with other institutions. Some basic aspects of the proposed Centre are:

5.7.1 That its activities do not overlap with those of R&D centres and engineering firms; in fact the proposed Centre is not to be engaged in any such activity.

5.7.2. That it emphasizes processes and analyses of crucial importance in technology transaction during the early phases of a concept and a project. Most of these processes and analyses have received inadequate attention in the Arab States.

The proposed Centre emphasizes the conceptual, pre-feasibility and feasibility study phases of projects during which technology choice, participation of national institutions, cost and transfer opportunities are determined.

5.7.3 That it emphasizes services that contribute to the development of national as well as regional institutions.

5.7.4 That its organization be built around projects. It will have no permanent technical activity. The Centre's basic goal is to assist other centres to take over whatever service it is rendering. Repeated experience in different Arab States gives the Centre unique opportunities to learn from experience and thus to transfer this expertise.

5.7.5 That it overcomes some of the criticism that is levelled against regional institutions. It is thus proposed to establish a strong, autonomous, adequately financed institution governed by a competent body of technically qualified persons.

However, the ultimate responsibility for the success of the Centre resides in the hand of the Arab States, for it is they that appoint the members of the General Assembly to govern the proposed Centre. The quality and expertise of this body will effectively determine the Centre's performance.

5.7.6. That the limitations imposed on the Centre's institutional capacities automatically force it to co-operate and co-ordinate with national and regional institutions.

5.7.7. That the mode and extent of interaction by each Arab State with the Centre is to be determined by the State itself. The governing body of the Centre is of course responsible for establishing the Centre's policies and determining the allocations of its resources.

5.7.8. That the services to be supplied by the Centre may overlap marginally with those supplied by IDCAS in the industrial field.

IDCAS has undertaken to study some of the areas of potential interest to the Centre. But co-operation in this area should not pose any problems. Furthermore, the proposed Centre stands to work closely with ALO, ALECSO, FAO, ILO, UNIDO, UNCTAD, WIPO and UNESCO. All of these institutions undertake regional or international studies and compilation of data of potential use to the Centre.

5.7.9. That the seminar and workshop functions to be provided by the Centre aim at the diffusion of the expertise acquired to all relevant quarters at an adequate rate and on a suitable level. This diffusion guarantees that the Centre will not monopolize the knowledge it acquires but will rather put it at the service of national institutions.

It is clear that the proposed Centre is now conceived of as part of a complex system although its precise relationship to each State and national institution has to evolve in due time subject to the wishes of each State and the detailed policies determined by the Governing Board. Because of the wide differences between Arab States it would be very unwise to enforce a standard pattern of interaction with all of them.

6.0 The Arab Regional Centre for the Transfer and Development of Technology

The extensive consultations that have been undertaken with relation to this project indicate that it is both needed and feasible. Furthermore, as has already been discussed in Section 5.0 the need is already being translated into demand.

In this draft feasibility study every effort has been made to focus the functions of the proposed regional Centre on priority and strategic areas that presently receive limited or no attention. The mechanisms for cooperation with national and regional institutions are such that overlap in activities may be rapidly identified.

With time, new institutions will be created and the possibility of overlap may arise; thus, it is recommended that the Centre's programmes adapt themselves to the changing circumstances, always opening up new fields of activity.

At this point, it is useful to present a number of basic principles and guidelines that appear to be unanimously agreed on by all parties consulted.

1. The Centre shall serve in an advisory capacity only.
2. The Centre shall not undertake any hardware R&D programmes during the initial founding period (first three years), this policy to be reviewed at a later date.
3. The Centre should concern itself with critical and high priority problems and issues.
4. The Centre should assume an active role in the planning and selection of its programmes.
5. The Centre should not be expected to cover all fields of activity.
6. The Centre should assist the Arab States in the planning and development of national institutions for the transfer and development of technology.
7. The Centre should promote the establishment of adequate linkages between the proposed regional centre and the national centres operating in the Arab Countries.

The general and specific objectives of the Centre should be clear from Sections 3.0 to 5.0. Furthermore, the document entitled Mechanisms for the Transfer and Development of Technology in the ECWA Region (E/ECWA/50, 22 March 1977) also provides a standard list of objectives.

In what follows the Report shall attempt to discuss the basic factors that are essential to the establishment of this institution. Institution building in developing countries is a complex and difficult activity that must be approached with considerable care and skill. It is strongly urged that the implementation of the project, if and when carried out, be executed without haste and with meticulous attention to endowing the institution with more than adequate resources to meet future crises. Once the basic objectives and functions are agreed upon, the thrust should be on the design and establishment of a powerful and healthy institution. Work programmes are of minor importance because the staff should be able to prepare more detailed and comprehensive programmes that can be done at this time.

6.1 Functions and Activities of the Centre

The recommended functions, services and programmes to be presented are the product of the extensive discussions and consultations that emerged out of the interagency meeting and the two missions' visits to 20 Arab States. In the light of these discussions and findings the initial functions presented in Section 6.0 of the Working Paper (op.cit.) have been modified in several important ways. The definition of some of the functions has been changed; the training function was moved out of the core programme (here called Permanent Programme) where it would necessarily constitute a small scale activity and included as a separate function.

In the light of the wide range of services in demand it is also strongly recommended that the Centre be active in five major areas instead of the three originally suggested in the Working Paper (op.cit., Section 7.0). Furthermore, as a consequence of the range and highly specialized types of services favoured by the officials, the scale of activity recommended is substantially higher than was intimated as the minimum in the Working Paper.

The recommended activities of the Centre are of two types: permanent programmes and short term projects. All the permanent programmes are grouped together while the short term activities are discussed by type of function. Each grouping of similar activities constitutes what is called here a function. The high priority subjects enumerated both at the preparatory interagency meeting and by government officials may be grouped under five functions. The functions presented in the Working Paper that received limited interest are therefore dropped.

6.1.1 The Permanent Programme

The activities that the Centre is required to undertake as an integral part of its own development and in response to repetitive requests from Arab States are: programme planning, organization of conferences, research in institution building in the Arab World, preparation of requests for proposals and the nomination of consultants. Services rendered under this title should be performed on short call and their cost covered by the subscription fees of users.

These activities should not consume more than 14% of the total work load of the Centre. However, because of their importance to the development of the Centre and its relationship to the Arab States, the performance of these activities should always be at a very high level of expertise.

6.1.1.1 Programme Planning

In order that the Centre render useful services, it must possess forward policies based on sustained and systematic research. The work undertaken under this title should have a fundamental bearing on the Centre's policies.

6.1.1.2 Research in Institution Building

The Centre should have a permanent research programme to study the problems and conditions of Arab institutions concerned directly or indirectly with technology and the measures that may be taken to enhance their stability, productivity, usefulness and relevance.

6.1.1.3 Nomination of Consultants

The Centre should assist governments in identifying and recruiting suitable consultants, This assistance would call for the establishment of both a significant brain bank on specialized Arab manpower and a routine system of interviewing and evaluation.

6.1.1.4 Preparation of Requests for Proposals

Ministries and institutions frequently need the services of competent system analysts experienced in the preparation and execution of proposals to assist them to prepare "requests for a proposal". Well designed RFP's provide the particular institution with a useful document for soliciting contractors to submit proposals.[1/]

6.1.1.5 Conferences

The Centre should organize one or more professional conferences annually on specific subjects. The purpose of these conferences would be to bring specialists together, to draw attention to certain important topics and to generate new and critical literature.

6.1.2 Projects Activity - The Functions

The five functions discussed earlier as covering the services in demand by the Arab States are defined and discussed in this Section. On the whole, these five functions constitute a coherent unit.

6.1.2.1 Policy Design

This function calls for specialization in a number of subjects that are directly or indirectly related to public policies and their influence on technology change and transfer. Frequently, the causes influencing the process of technology change may be institutional, political, social or economic. It is recommended that the adequate empirical studies be concentrated on three major areas:

1/ A competent analyst working closely with a technical group will require 1-2 man weeks to prepare an RFT.

1. The systematic study of contract design and contract negotiations with reference to cost, technology choice, project organization and execution, transfer of associated technology, sub-contracting to national or Arab firms, procurement of services and supplies, patent licensing, restrictive clauses and validity of patents.
2. The systematic study of technological activities in major sectors of the Arab economies should be undertaken. In these studies, special emphasis should be given to the processes of technology transfer, the role of national institutions, the development of national and regional engineering and contracting capabilities, forward and backward linkages of existing and new economic activity, employment, economic stability and social well being. Under this title, both the transfer and indigeneous development of technology shall be studied.
3. Providing assistance to the national centres in Arab States in the preparation of technology plans as an integral part of their national development plans.

Some technologies such as agriculture, civil engineering, engineering design and contracting, iron and steel, petroleum and petrochemical should be of interest and concern to most Arab States. Here some $ 30 billion is being spent annually. It is recommended that the regional Centre embark on several (at least three) large-scale projects (10-30 man - years per project) for the study of the status of these technologies in the Arab world and current practices utilized in acquiring, managing and developing them. Such studies should prove to be of almost immediate value to the policy makers and planners.

6.1.2.2 Seminars and Workshops

The increase in the number of expert manpower should contribute to the increase in the absorptive capacity for technology; it should increase planning abilities and should render Arab States more self-reliant in decision making. One of the missions of the regional Centre is the diffusion and transfer of its

expertise to Arab States through seminars, etc. This function calls for the planning and holding of specialized short and long term programmes for these purposes. Because of the limited financial resources of the regional Centre and the vital role that should be played by the national centres, all seminars and workshops will be planned for senior officials as well as for planners of training programmes. The Centre should hold seminars and workshops only on topics it has projects in. However, the regional Centre may assist national or sister regional institutions to plan and hold such activities. This function is of crucial importance because it assists the individual States to become self reliant.

The Centre should include a wide variety of services under this title, such as ministries and institutions in Arab States to organize and hold their own seminars, workshops and training programmes. The programmes organized at the Centre should be non-degree activities expressly organized as workshops and seminars for responsible officials engaged in a particular function. These activities should not be aimed at newcomers to a discipline and should not be introductory in nature; rather they should be designed and focused on specific issues of direct concern to the participants. These programmes should be frequent and should focus on critical problems and issues. For example, the area of institution building could be the subject of numerous seminars and workshops a year. This series could, for example, be focused as follows on specialized and vital institutions or functions:

1. Ministries of planning and the planning function,
2. Labour ministries and organizations in relation to technology change and transfer,
3. Directors of vocational and technical schools,
4. Contract negotiation in the civil engineering field,
5. Project planning in the petrochemical field and technology transfer,
6. Project management in the textile industry field and technology transfer,
7. Procurement problems in the execution of construction contracts,
8. Transport problems in the execution of land reclamation projects,

9. The cost structure of projects in the civil engineering field
10. Current ministerial procedures for project planning, and so on.

The seminars and workshops may be regional or specially designed for one particular country. The training requirements of the Arab States vary considerably and it thus is essential that the Centre approach this problem imaginatively and be prepared to adapt its services to each specific circumstance. They may be specially designed for a particular ministry planning to embark on a new project and wishing to simulate a future situation. What should be insisted upon is that the Centre should not offer courses and training that may be offered by universities or university faculties, but that each programme be designed and conceived for a highly specialized group of officials concerned with a complex and difficult problem.

The Centre should examine the existing institutional facilities for supplying other types of training; it may have to organize seminars and workshops for university and ministry of education officials to discuss these needs and opportunities. The Centre should also consider the preparation of special series of monographs for the express use of university students and self-taught individuals.

The scope of activities under this title is enormous. Yet it is vital that the planning of this function by the Director of the Centre be as much as possible related to and based on to the on-going activities in the other functions.

The Centre's information and publication services and policies should play a supportive role in this function. The participants should acquire the capacity for utilizing the information resources and services of the Centre. Thus the participant-Centre association should not be a short, fleeting one but rather a beginning for a long relationship through which the participant may continue to benefit from the information services of the Centre.

6.1.2.3 Assisted Information Transfer

Careful analysis of the expressed needs of the Arab States for information has shown that a variety of services are needed. Information is sometimes conceived

as consisting of precise facts. This, of course, is approximately true only in the basic sciences. But in technology one rarely is concerned with the information on the velocity of light or the molecular weight of PVC. For the Centre to respond to the needs of the area it must be equipped to go far beyond the provision of simple well defined "facts" and should develop an expertise in supplying a much wider, and less objective, category of information. We shall very briefly exemplify the nature of the services that are needed. The examples given do not exhaust the possibilities of necessary services.

The simplest type of information is one where the Centre has to respond to a request for either a copy of a specific report or a published article. Next in complexity is the case when it is asked to prepare a bibliography on, say, the scientific literature on the production of single cell yeast from petroleum. A task of equal complexity is when it is requested to determine the period of validity of a patent or a listing of all patents on a specific refining process or on the synthesis of some product. It often happens that planners wish to explore quickly a large number of points and possibilities before determining what pre-feasibility and feasibility studies are needed. Thus, a large amount of information and brief reports are called for at the conceptualization phase of a project.

More complex information requests consist of, say, the comparative analysis of the unit cost of production of polyethylene by the different known processes; or an assessment of research on the preparation of methanol during the past five years and the expectation of a breakthrough in the current methods for its synthesis. Which company is utilizing which patent? Why? Since when? This latter type of question is basically a request for information plus evaluation; the response to such questions will require the time of senior staff. What adds to the difficulty is that the appropriate answer to such questions often depends on a number of contingencies. These and other types of complex information may often best be provided by assisting the interested party to use the Centre's resources and its access to international information systems.

It is recommended that the policy of the Centre on this topic remain very flexible. Governments that lack the staff to carry out such studies may have to be assisted fully by the Centre. In such a case, the information transfer will be equivalent to a pre-feasibility study. Whenever possible, the regional Centre should endeavour to direct technical requests to national or specialized regional institutions.

For the provision of this category of "international" information services, the Centre must develop an effective library collection, a systematic capacity to access all the relevant available data banks in the world with which it should be linked, and to possess a knowledgeable and learned library staff.

But this is not the only type of information that is being called for. Information for negotiating contracts may entail data on different countries and contracts. For example, the background information required for negotiating a $ 16 billion contract (e.g. the gas collection scheme in Saudi Arabia) could involve a considerable volume of information on: the contractors bidding for the scheme, conditions in the steel industry (since the scheme consumes some 20 million tons of steel), cost of comparable schemes, difference in the cost between importing the approximately 2,000 km of (16/18/40 inch diameters) pipes to be used in the scheme as pipes or as ingots to be extruded in a plant that could be constructed for the purpose in Saudi Arabia, Basra or Suez, shipping costs, insurance, etc. The information requirements for effective negotiations are enormous and must be tailored to suit each case. Negotiations for a steel mill in Algeria with German firms will pose completely different information problems from a dam project in Iraq negotiated with the U.S.S.R.

Information of importance to contract negotiations is extremely time-dependent. Changes in the level of unemployment in a particular country may give the Arab negotiator considerable bargaining power, reducing the cost of the project and the terms of finance. Information is not only needed for negotiation but also for execution. It may be found that steel prices in 1979 are expected to be 50%

higher than in 1978. If the project is to be executed on a cost plus basis, then the contract should specify some suitable arrangement to make use of such a likely price difference.

It is recommended that the Centre be fully equipped and staffed to provide very complex and sophisticated information. This information may be provided for a fee to users.

To a considerable extent, most of the above-mentioned information is generated in advanced countries and is available. There is a category of information on the Arab world that may not be available publicly or privately. The generation of some of this information can only be the outcome of extensive field work and research, for example, information on: the cost structure of different types of projects executed in the Arab world; and licensing fees being paid by each Arab State. The work under function 1 will contribute to the generation of this category of information. The Centre could also collaborate with national institutions to compile this type of information.

The information the Centre should be able to provide may extend beyond the strictly technological dimension. The financial state of the contractor, the value of his stocks, currency fluctuations, the state of the economy of his country and his government policies are the export trade all have direct and immediate relevance to negotiations.

A saving of 1% on a $ 10 billion project is worth $ 100 million; 1% on a $ 100 million project is worth $ 1 million. The gains may consist of a better selection of the technology and of including better procurement and sub-contracting clauses.

The Centre should also undertake field studies of the production, dissemination, transmission and use of knowledge in the region with a view to assisting the institutions with the development of their information resources.

It is clearly not recommended that the Centre become a documentation centre or a data bank. The objective of the above discussion is to emphasize the profound integration between staff and information. The aim of the Centre should be to provide digested and assisted information.

6.1.2.4 Cooperation, Coordination and Integration

These three functions are overlapping and are best treated together. It is important to discuss briefly what is to be coordinated and integrated, for what reason, and by what mechanisms. The most obvious type of institutions that may be involved here are R&D and consulting institutions that already possess certain expertise and traditions. Here the Centre should contribute in a number of different ways to the diffusion of accurate information on each institution and participate in joint activities. Whenever the need or opportunity arises, the Centre should utilize the capabilities of existing institutions for undertaking specific tasks. Since there are some 300-500 research centres of various sizes and levels of competence in the Arab world, this effort towards cooperation and avoidance of duplication will require substantial manpower.

The regional Centre will depend to a considerable extent on these national and regional institutions for expertise in technical matters.

However, technology is practiced and utilized in a much larger number of firms and institutions than is circumscribed by R&D centres. It is the iron and steel firms, the fertilizer plants, the large and small industries that are directly involved in programmes of technology transfer, procurement and sub-contracting. Currently major national firms (public or private) do not have adequate knowledge about the new projects that are relevant to their production or development plans. Furthermore, even within the same ministry one finds projects conceived in isolation from each other. Few of the attempts at integration of projects within the framework of the development plans have attained their objectives.

Naturally, if cooperation, coordination and integration of projects on a national level meet with difficulties the equivalent activities on a regional level are virtually non-existent.

Mechanisms for mobilizing and integrating Arab capabilities in consulting, contracting, manufacturing, etc., are still weak and require considerable development.

The mechanisms for effecting such cooperation and integration are reasonably well known. For one thing very little may be achieved without accurate and timely information. Such literature should be produced by ACSAD, IDCAS, the Arab Union of Engineers, and various other national institutions. But the Centre should play an important role in identifying the type of information and communication channels that are lacking and endeavour to support and promote efforts for overcoming these shortages.

The Centre's contribution to the integration of efforts in technology can best be seen in three domains:

1. The promotion and integration of national and regional institutions performing complementary roles in the technology tool and products cycle (Figure 1, Working Paper, op.cit.);
2. The promotion of the engineering industries and, through them, the Arab capacity for engineering design and sub-contracting;
3. The promotion of Arab capacity for sub-contracting.

Thus under this title the Centre is expected not merely to avoid duplicating the programmes of R&D Centres but rather to provide vital and strategic services in sufficient depth and intensity to create solid bonds between other institutions and projects.

A topic that may be treated here and under function 1 is the integration of science and technology with development planning. This, of course, is a problem of long standing and is receiving attention from various directions, including UNCSTD 1979. Under this title, the subject should be viewed as a problem of integrating different government institutions. A careful analytical study of the evolution and status of the mechanics and nature of the planning exercise in a number of Arab States should provide useful materials for government action.

Thus, the Centre may:

1. undertake periodical surveys of R&D institutions, and diffuse information in standard and easy-to-use formats;
2. analyse development plans and projects in terms of their technological components and assist governments, manufacturers, and institutions in identifying Arab sources of technology for undertaking the execution of projects;
3. identify areas of technology which require rapid development to meet planned needs;
4. propose national and regional legislation designed to introduce standards and quality controls to facilitate the integration of national production of materials, supplies and equipment via sub-contracts with foreign engineering firms for installations in the Arab world;
5. serve as an <u>informational clearing house</u> for governments, contractors, labour organizations and professional organizations;
6. prepare annual directories on Arab engineering, contracting and manufacturing firms with a view to improving communication between them and other economic activities;
7. compile information on all projects in the Arab world from the conception and technical feasibility study phases to the termination phase, this information to be codified and made routinely available to assist Arab engineering, manufacturing and contracting institutions to plan, adapt and seek to participate in those endeavours in which they are qualified.

6.1.2.5 Development of Appropriate Technology

The Centre shall engage itself in the study of technologies that are or may be relevant to the Arab States. The Centre shall study, evaluate, assess specific technologies whether in use in the Arab world or not and would develop methodologies for the assessment of appropriateness.

There already exists a large variety of technologies in the region; much of these have originated in the area while others are of more recent acquisition. Yet the geographical diffusion of these technologies within the same country or throughout the region is slow.

The emphasis of this function should be on the technology rather than the policy aspect of programmes. Nevertheless, the interaction between technology and policy must not be avoided. Activities under this title will provide the Centre with numerous opportunities for cooperative work with Arab R&D institutions. Detailed technological studies on water use, agricultural methods, construction, etc. will depend on close collaboration with national and agencies of the United Nations, institutes and centres.

The Centre should also undertake systematic and organized field and literature surveys of technological activities in other developing regions of the world as well as in advanced countries in order to be appraised of on-going developments. This may be accomplished by the utilization of published literature, frequent trips to other countries by senior staff and possibly the establishment of permanent offices in regions of the world generating useful technologies of relevance to region.

6.1.3 Level of Activity and Scheduling

The size of the Centre in terms of staff and budget is a variable that is dependent on a number of considerations. Some of the most essential shall be enumerated and discussed. We shall be concerned here purely with the staff required during the first three years and which may have to be supported from the Centre's financial resources. The proposed staff will be utilized on unsolicited research programmes expressly planned by the Centre to develop the basic tools and data base for effective and large scale contributions to the Arab States. It is this type of programme that would impart to the Centre its uniqueness and usefulness.

Two levels of activities for the proposed Centre will be presented. Level A denotes the minimal size that would still enable the Centre to offer some services in the requested five functions. In level A the scope of work will be limited and the services offered may not cover all the Arab States. In level B the Centre shall be able to provide services that could reach every Arab State. Letters A and B after a number shall denote that the numbers presented refer to levels A and B respectively.

The level of activity shall be presented in terms of senior manpower at the Centre for three periods:

First period: preceding the appointment of the first director

Second period: the first year after a director is appointed

Third period: the second year after a director is appointed.

It is recommended that during the first period the first and only appointment be that of the director. By the end of the second period work in progress should have grown to require 60 (A)/125 (B) senior staff and consultants. It is recommended that during this period the ratio of staff to consultants be 1 : 2 and that the average overall level of effort for the year be close to 16 (A)/40 (B) man-years.

By the end of the third period it is reasonable to expect that work in progress should have grown to 100 (A)/250 (B) senior staff and consultants, the ratio of senior staff to consultant increased to 1 : 1 and the overall level of effort for the year to be 64 (A)/160 (B) man-years.

During the succeeding three years the Centre should aim to stabilize staff, decrease the use of consultants to 40% and become self-financing from the services it renders by the fourth and, at the latest, the fifth year. Furthermore, during this period size will be determined by the capacity of the institution to manage projects as well as by the requests for the Centre's services.

In 6.1.1 and 6.1.2 sufficient information was presented on the basic functions and work to be performed by the staff of the Centre to enable us to estimate the level of effort needed.

It is recommended that the Permanent Programme be budgeted with 14 (A)/20(B) senior staff (14 (A)/8 (B) % of the Centre's staff). Only 3 (A)/6 (B) out of the 14 (A)/20 (B) are for strictly internal work. The remaining senior staff are all committed to providing services to Arab States. With the same five senior staff it should be possible to cover one to two categories of institutions each year. With two/three staff members it should be possible to organize and publish the proceedings of 3 to 9 major technical conferences each year; with four staff members it should be possible to prepare about 100 RFT's per year. This would constitute some 4% of all contracts signed annually with international firms. Nomination of consultants should not require more than two staff. The only activity here that may turn out to be underestimated is the programme planning. The Centre's programme design and planning shall be a particularly complex matter for several reasons: the use of programme budgeting; total commitment of staff to projects rather than to departments; and the impact of the external policies of the institution concerning cooperation and coordination on the design of projects. This figure of 3 (A)/6 (B) may have to be increased.

The bulk of the staff and consultants of the Centre are to be committed to projects falling under the five functions 6.1.2.1 to 6.1.2.5.

Projects and programmes vary in scope. Two basic principles have been utilized in estimating the scope:

1. that the studies should be sufficiently detailed and comprehensive to constitute a definitive contribution and a basis for decision making.
2. that the services are sufficiently extensive to make substantive contribution to the 21 Arab States and to regional organizations.

The parameters utilized, the number and scope of projects and the frequency of the services are summarized in table 3. At this time, it is not possible to state the range of these parameters and services more precisely. The precise numbers have to be determined for each individual case at a later time.

The management of the Centre and the projects will require an additional 5 (A)/10 (B) senior staff. With a total of 96 (A)/230 (B) staff members an additional 4 (A)/10 (B) men will be needed for contingencies. Thus the total is 100 (A)/250(B). Table 4 summarizes this information.

It is, of course, possible in principle to have fewer workshops and seminars, few policy studies, and to reduce considerably the proposed programmes both in scope and depth. The central conclusion from the extensive consultations conducted is that the Arab States feel the need for high quality service in a large number of fields and are not interested in either limited or poor quality service. The unfortunate criticism directed at some existing institutions should serve as a warning against too limited a programme.

TABLE 3

		Level of effort per unit of activity	Recommended Number of activities/year	
			Level A	Level B
6.1.1.1	Programme Planning	About 3% of manpower committed to projects	3	6
6.1.1.2	Research in Institution Building	2 to 3 man-years per study	1 to 2	1 to 2
6.1.1.3	Nomination of Consultants	-	200	200
6.1.1.4	Preparations of RFP's	1 to 2 weeks per RFP	100	100
6.1.1.5	Conferences	6 man-months per conference	4	6
6.1.2.1	Policy Design	1 to 4 man-years for medium-scale projects 8 man-year per major project	2 to 3 medium-scale and 2 to 3 major projects	4 to 6 medium-scale and 4 to 7 major projects
6.1.2.2	Seminars and Workshops	6 to 12 man-months to prepare and hold a seminar or workshop	8 one-week seminars 3 two-weeks workshops 10 one-month workshops	25 one-week seminars 10 two-weeks workshops 30 one-month workshops
6.1.2.3	Assisted Information Transfer	4 weeks per enquiry 1 to 3 man-years for study 2 to 5 man-years to develop data bank	200 1 to 2 studies data bank	600 3 to 10 studies data bank
6.1.2.4	Cooperation, Coordination and Integration	Projects data collection and analysis: 5 man-years; Institutional data & studies: 10 man-years; Implementation of programmes of coordination, etc: 15 man-years	Programmes involving 250 to 500 institutions	Programmes involving 500 to 1000 institutions
6.1.2.5	Development of Appropriate Technology	50 to 300 man-months per project: average 100 mm/project	1 to 2 projects	3 to 6 projects

T A B L E 4

Recommended Level of Effort

		Senior Staff	
	Permanent Programme	Level A	Level B
6.1.1.1	Programme Planning	3	6
6.1.1.2	Research in Institution Building	3	5
6.1.1.3	Nomination of Consultants	2	2
6.1.1.4	Preparations of RFT's	4	4
6.1.1.5	Conferences	2	3
	Function		
6.1.2.1	Policy Design	25	60
6.1.2.2	Seminars and Workshops	17	50
6.1.2.3.	Assisted Information Transfer	10	30
6.1.2.4	Cooperation, Coordination and Integration	15	30
6.1.2.5	Development of Appropriate Technology	10	30
Centre and Projects Management		5	10
Contingency		4	20
GRAND TOTAL		100	250

6.1.4 Governance

Governance consists of the authority and responsibility invested in an external body for the management of an institution. Such a body has the authority and responsibility for determining its policies within a prescribed enabling constitution; in monitoring and evaluating its functioning; in legitimizing its public existence; and in ascertaining and approving its financial operations. This responsibility includes the adoption of sound financial policies, and intervening on behalf of the institution with the appropriate authorities to support the

institution's activities. The quality and performance of an institution are a direct reflection of the quality, seriousness and capabilities of its Board of Governors.

One of the basic duties and responsibilities of the governing body should be the appointment and termination of the director of the institution. The safeguard of the interests of the institution requires that this appointment be undertaken after careful deliberation and investigation. The Director is the exclusive representative of the Board within the institution. Sound management practices require that no member of the Board should intervene in the internal affairs of the institution. Proper procedures should be adopted in the event of a difference of opinion between the Board and the Director.

All high ranking senior staff may be appointed by the Board upon nomination by the Director. In all cases, these appointments should be carefully reviewed. The Director may not terminate high ranking senior staff: he may <u>recommend</u> their termination to the Board.

The governing body of a new institution of the type under consideration:

1. Must necessarily possess competence in the affairs of the institution. For the proposed Centre, this includes competence in economics, social, legal, technological, managerial, financial and Arab political affairs and problems.
2. Must be able to devote considerable time to the study of its problems and to attend a minimum of two annual meetings.
3. Must be committed to the concept of the Centre and be prepared to devote their energy to the success of the project.

The number of persons serving on the Board should be sufficiently large to reflect different points of view, yet sufficiently small to permit effective collective behaviour.

The system of governance should permit a satisfactory representation of all Arab States and of relevant regional institutions and at the same time provides a compact and effective system of management. This system is one consisting of a General Assembly & a Governing Board. The General Assembly may consist of one representative from each Arab State, one from each regional institution (e.g. OAPEC, the five Arab Funds, agencies of the Arab League such as IDCAS, ACSAD, ALECSO), ECWA and ECA. The national representative will be appointed by each government for a period of three years. This General Assembly should meet once every two or three years and elect from its members a 9 to 14 member Governing Board.

The advantage of such a system is that it affords an opportunity for all relevant institutions and governments to be represented in the management of the institution. The large size of the General Assembly disables it from effective participation in the affairs of the institution. This is compensated for by a smaller Governing Board.

Irrespective of the type selected, there must be both continuity in the membership of these committees and planned change. Though all members should eventually be appointed for a period of three years, there should be a systematic process of replacement during the first three years. For example, one third of the initial membership is appointed for three years, one third for two years and one third for one year. All replacements should be appointed for three years. Reappointment should be possible, the Director of the Centre to be an ex-officio member.

Members of the General Assembly and the Governing Board should be appointed on their own merit and for a fixed period. They should not be temporary delegates by virtue of a position they hold. This is a necessary qualification to achieve continuity.

Meetings should follow Roberts Rule and all decisions must be taken by a majority vote.

6.1.5 Organization and Structure

Basic Rules and Conditions

The Director of the Centre has to possess full authority to execute the programme approved by the Governing Body within the:

1. Approved administrative procedures
2. Approved personnel procedures and salary scale
3. Approved Budget and work programme.

All rules and regulations and salary scale should be expressly designed in the light of a realistic appraisal of the manpower market conditions and the location of the institution.

The Centre should develop a sound policy on staff career structure to be able to retain the services of competent staff. The Centre should develop a programme for the attraction, development and retention of capable young professionals. Thus the Centre's career structure should clearly exhibit the process from initial appointment to the various steps in the ladder of promotion and the criteria to be met to move from one level to the next. It is strongly recommended that this process exclude degrees and tenure of post as basic criteria and depend nearly exclusively on performance as expressed in publications and reports (published or unpublished) but all must be available to the evaluation committee. (See later). Standards and procedures for staff assessment and evaluation must be realistic, known to all applicants before appointment and carefully and fairly implemented. Research, consulting, training and education are activities that may appear difficult to evaluate, yet persons experienced in the field will find little difficulty in judging performance if all the output of each individual is adequately recorded. Thus the management system of the Centre should be no different from that of sound business consulting firms where such records are routinely kept.

Explicit, rational, efficient, conducive and supportive management procedures are absolutely necessary for the proposed Centre. The considerable difficulty of the Arab environment, the enormous pressures that will be placed on the Director and his senior staff to "prove themselves" and "to deliver services", the modest budget

that will most probably be allocated, should stimulate the Centre and its Governing Board to refuse short cuts or savings when it comes to the procedures for the management of the Centre.

This emphasis on sound management practices should in no way result in a bureaucratic institution: the Centre should be operated as a high power think-tank/ consulting firm; the recommended management procedures should be a tool to achieve such a purpose.

6.1.5.1 Structure of the Institution

In order that the Centre be able to undertake the type of proposed functions it must possess an adequate form of organization. It must possess capabilities for:

1. Planning: to design and plan future programmes
2. Programme management: to supervise, review, evaluate current activity, whether in training, research or conferences.
3. Finance and Administration: of legal, finance, support facilities, staff, communication
4. Effective Centre - User relations: between Arab world and Centre. This is not a public relations function, but a systematic planned professional relationship between the Centre and counterparts as part of the Centre's programmed services to communicate its findings, identify problems, discuss new projects and keep the users of the Centre personally abreast of its activities.
5. Programme support facilities: library, computer, data banks
6. Projects: the staff and services that will be necessary to conduct the programmed projects, typing, printing cost, translation

The identification of these activities is necessary at this stage because they do have cost, management, and organizational implications. One of the common weaknesses of Arab institutions is the weakness of the planning and management functions. Normally, these are assumed to require very little time and to fall within the purview of the Director. Although no doubt the Director should be ultimately responsible for the planning and review of the institution's output, the

quality and level of this planning and supervision are normally extremely limited.

The planning and programme management functions are essential activities in the identification and pursuit of institutional objectives as well as in the control of the quality of the Centre's output and the institutional management of projects. It is through such functions that a project experience is internalized and institutionalized. Methodologies and models are revised, discarded, modified. These functions permit the institution to digest and learn from its activities. All too often, one finds institutions that employ a consultant for a job. Once the consultant's report is presented he no longer belongs to the staff. The report is shelved and presented to a client. However, the institution has not absorbed the consultant's findings. An institution such as the proposed Centre will depend on consultants for a considerable volume of its work. For this reason the functions indicated are vital to its growth and reputation. As far as the client is concerned, it is the Centre that is responsible for the report and not the consultant. The consultant is merely responsible to the Centre. For the Centre to render credible services it must have the procedure and qualified staff to evaluate and edit every report and every publication it issues.

The <u>design</u> and <u>selection</u> of projects should also be primarily an institutional matter within the framework of an <u>institutional</u> programme and policies. All too often in Arab institutions, it is the consultant who proposes and/or designs new projects; the entire life-cycle of a project is thus external to the institution.

This document dwells at length on these points because they are often neglected; and this neglect contributes to the observed weaknesses of Arab national and regional institutions.

It is recommended that the Centre have no divisions or departments and that all staff be freely transferrable from project to project - naturally depending on qualifications and abilities - and from function to function. Thus it is recommended that there be only ranks, e.g. "Senior Analyst", "Associate Researcher", "Research Assistant". It is recommended that the management positions consist of:

Director, Chief of Projects Division, Chief of Administration and Finance, Finance Officer, Administrative Officer, Manager of Computer Centre, Information Officer.

The Director should serve as the direct manager of the Planning and Programme Management Unit. The Computer Centre Manager and Information Officer should report to Chief of Projects Division, the Two Chiefs to report to the Director.

In this arrangement the Director is to fulfil four central institutional functions:

Planning
Communication with Governing Board
Programme Management
Overall supervision of finance and administration.

The full weight of project management should be placed on the Chief of Projects Division. This provides the institution with the requisite process to separate the execution of a project from its review and assessment.

In this recommended organization, all activities of the Centre - including those enumerated under the Permanent Programme - are projects and thus their execution is the responsibility of the Chief of Projects.

The relationship between the Centre and the users should not be based on a "public relations" basis, but rather as an integral part of the Centre's programme. All staff should be involved in such a programme.

6.1.6 Mode of Operation

It is recommended that the Centre adopt programme budgeting in order to facilitate internal supervision and fruitful involvement. The methodologies of planned programme budgeting will permit the Governing Board and the Director to discuss fully and meaningfully the Centre's planned activities. The approval of the programme can then be transmitted directly to the projects department. The Chief for Finance and Administration can then perform his duties within the same framework.

In an institution of the type proposed there are two transactions that are crucial to the Centre:

1. The negotiation and development of a project with a client
2. The completion and submission of the project reports to the client

Both of these transactions must pass through the Director. The Planning and initiation of any project and the documents to be submitted upon termination should receive the Director's explicit approval.

No staff member should be able to commit the Centre to any project or submit any formal report without prior clearance. Naturally, the project manager submits his reports to the Chief of the Projects Division, and it is the latter who submits the final reports to the Director. It is one of the chief duties of the Director to see to it that every document is expertly reviewed and evaluated. Reports should not be submitted before the indicated changes are carried out.

A project should receive periodic review in formal sessions by a committee constituted by the Director. The frequency of the review depends on the complexity of the project, its duration and its nature. The purpose of these reviews is not only to ascertain that programmes are on schedule but to assist the project manager in the development of methodology, to transfer methodologies developed by a project manager to other programmes and so on. Hence these reviews have a routine, a learning and an institutional function.

6.1.7. Project design and integrative role

The Centre will be able to contribute in a number of different fashions towards this goal. Whenever possible, (and as long as this does not prejudice the project or the development of the Centre) it should be the Centre's policy to:

1. Sub-contract portions of a project to national and regional centres,
2. Utilize existing faculty resources of Arab universities,
3. Participate in joint ventures.

It is advisable that, although the Centre should be in principle agreeable to such relationships, each new arrangement be carefully planned and the roles and responsibilities explicitly specified. It is far better not to enter in an agreement that has a possibility of contributing to inter-institutional tensions or client dissatisfaction. Until the Centre has acquired sufficient experience

in the design and execution of such forms of co-operation, emergency plans should always be built into each such project in case the co-operative arrangement does not succeed. The Centre's policy should be always to meet deadlines and not to accept a project unless it can guarantee its successful termination. Such a policy is not easy to pursue; the policy may be costly; risky projects should be avoided, no matter how important or interesting.

6.1.8 Staff and Consultants

The mode of operation of the Centre depends strongly on the percentage of the load of its activities carried by short term consultants. A number of regional organizations depend heavily on consultants for the execution of programmes. It is not possible to build the capacity and facilities of an institution unless a substantial part of the project management and the studies are undertaken by permanent staff. It is difficult to set a precise figure as to what could constitute a dangerously low level of staff participation. It is recommended that this matter be kept under close supervision during the first five years of the Centre's life. During this period effort should be made to execute at least 60% of the projects with permanent staff. It must be remembered that during this period all staff is new and must be integrated into an effective team. Furthermore, there is an unusually high rate of turnover during the first few years in the life of an institution.

During this initial and critical period all staff and consultants should be subjected to brief training programmes in project management in order to standardize the Centre's procedure and develop adequate forms for each particular situation. The experience gained should not only serve to improve the Centre's procedures but should be diffused through specialized training programmes and publications.

6.1.9 Relationships of the Regional Centre With Other Centres

There already exists in the Arab world a large number of functioning national, regional and international institutions. At this time it is useful to establish broad guidelines as to the nature of the relationships the Centre should seek to develop with these institutions.

It is recommended that the Centre be guided by three general principles:

1. To utilize the exis' ng institutions in a manner and to an extent that permits it to provide effective services to the Arab States;

2. to endeavour to assist existing national and regional institutions to develop their resources and capabilities;

3. the regional Centre, as well as the national and sister regional institutions, should seek simple and non-bureaucratic relationships. The regional Centre must always conserve its capacity to manage and deploy its resources to fulfil its mission subject to its statutes and the directives of its Governing Board. The regional Centre should not enter into any relationship that interferes with its ability to fulfil its mission.

It is to be expected that the intensity of interaction of the proposed Centre with individual institutions is contingent on the nature of the projects under execution. Thus the Centre may not have much to at any one time with a large numbers of these institutions.

These problems will now be discussed by types of relationships.

6.1.9.1 The Arab States and the Regional Centre

The services of the Centre are generally useful to ministries and large public institutions such as state organizations. Specialized national institutions in engineering, R & D planning and information may also have occasional use for the services of the Centre. Some Arab States have already established committees and/or Centres for the transfer and development of technology. Other

States presently possess only rudimentary planning, R & D or engineering institutions. It is recommended that the relationship between each Arab State and the Centre be designed on the basis of needs, wishes and capabilities. This relationship should be subject to review and evaluation by both parties and at regular intervals. Thus some States may wish to channel all communications between the regional Centre and government institutions through a national institution, others may establish two or more formal channels of communication. The fact that all the Arab States have had formal links with international and regional organizations for a considerable period of time provides each State with an empirical record of the efficiency of such links. It is recommended that these records be carefully evaluated with a view to designing effective channels of communication between the Centre and the individual States.

In the event that a State does not possess a national Centre for the management, transfer and development of technology, suitable direct channels of communication between ministries and the Centre have to be designed. Again these communication channels should be subject to study and review at regular intervals.

The regional Centre on the other hand, will need the services of some national institutions in the execution of regional studies and programmes. It is recommended that the regional Centre be authorized to communicate directly with relevant institutions whenever the regional Centre requires their services for the execution of a project it is initiating. In all these interactions, the elements of speed and efficiency should be of considerable importance. Because the regional Centre will not possess any R & D or engineering capabilities its operations may be severely curtailed unless it can enter into a direct and effective relationship with national institutions. The alternative of utilizing the services of foreign institutions should be utilized only in extremis and not as a routine procedure.

Clearly, effective interdependence between the regional Centre and national institutions must be patiently and carefully developed. Both parties must make positive contributions towards the establishment of these relationships.

Often, the regional Centre may require the assistance, co-operation or participation in its programmes of specialized units in ministries. It is understood that official authorization may be required. However, because the body of technology and experience possessed by some of these institutions is enormous, it is hoped that the Arab States will look with favour on such relationships.

6.1.9.2 The Centre and Other Arab Regional Institutions

A number of regional institutions affiliated with the Arab League, or essentially independent, presently exist. Some such as ALECSO,CAEU, IDCAS, AIO and others may have numerous joint projects with the Centre. It is recommended that the regional Centre evolve its pattern of relationships with sister regional institutions informally during the first two to three years.

Formal relationships embodied in co-ordinating sub-committees and the partitioning of areas of activities should not be considered until after these institutions have worked together for a few years.

The Arab development funds may be treated on two levels: as users of the services of the Centre and as partners in the execution of projects. The Arab funds, like some of the Arab ministries, already possess considerable experience and the regional Centre will need to depend on this expertise in its studies.

6.1.9.3 International Organizations and the Regional Centre

A number of international organizations that operate in and out of the Arab world exists. Many of these organizations have played -and still play- important roles in technological transactions. Thus the regional Centre will naturally have to communicate with them. Institutions such as UNIDO, WIPO, FAO, WHO and others may at times be partners in the execution of the Centre's projects. It is recommended that the regional Centre develop these relationships informally. It is also recommended that the formal representation of the UN family on the governing board of the Centre be limited to ECWA and ECA. The relationship of the Centre with all other UN and non-UN international organizations should be based on need and mutual agreement.

6.1.10 Budget and Finance

The determinants of the budget for the proposed Centre are: the scope, nature and diversity of the Centre. These have been discussed in Sections 6.1.1 to 6.1.3 in this report.

The unit cost per senior man is a function of: the Middle Eastern and world market demand for specialized manpower, the cost of living in the country where the Centre is located and, of course, the continuing inflation.

"Senior Staff" covers a large category of manpower and a fairly large salary range. For the purposes of this report, a senior man is one who can perform a task independently and satisfactorily. The salary range for such senior staff will range between US$ 20,000 and US$ 60,000 a year. For the purpose of this report US$ 35,000 will be assumed to be the average salary. To this must be added the cost of 4 support staff (typists, cleaners, accountants, research assistants, technicians, etc.) costing an additional US$ 15,000. Thus the direct salary of a senior man and his support become US$ 50,000. The overhead (indirect) cost consists of health and life insurance, retirement funds, moving expenses, computer time, cables, mail, travel, telephones, rent, heating and air-conditioning, stationery, etc.; it is a sum equivalent to the direct cost. Thus roughly the unit cost per senior man is US$ 100,000 a year. This may increase to US$ 150,000 or even to US$ 200,000 in some Arab States; in others it may decrease slightly.

For the purpose of the Centre the salary scale must be predicated against the international rather than the national rates. The Centre must offer such a salary and professional advantages that it can choose the staff it wants. The senior staff range of US$ 20,000 to US$ 60,000 overlaps with that of the UN scale up to the US$ 50,000 point.

At the present rate of inflation in the Arab States allowances must be made for a 10% to 30% annual increase in these figures subject to the location selected.

It is recommended that the Centre provides the staff with easy credit financing to purchase their own apartments or houses. Such a housing programme would not only assist in combatting the high cost of housing in most of the Arab States but also would discourage turnover among staff.

Thus a 250-senior men Centre will call for a budget of some US$ 25 million/year. In the original Working Paper it was estimated that a minimum viable size of a Centre would cost some US$ 6 million annually. However, after the detailed analysis of the mission reports, the scope of the services requested, the observed high rate of inflation in most of the Arab states during the past two years, the current level of salaries for this category of manpower, the estimate have had to be revised upward. A minimal size Centre of 100 senior men (level A) will call for a budget of $ 10 million/ year.

For the proper functioning of an institution most plans and staff commitments must be made one to two years in advance. This is impossible without a definite and regular income. For a new institution that is attempting to attract capable individuals away from their present occupations, it is essential that the resources to finance its programmes for a period of five years be available. Naturally, these resources are under the control of the Board of Governors and are invested to generate income. One of the common causes for institutional difficulties in the Arab world is their financial insecurity. Given financial security the institution should be able to plan and execute its programmes with confidence.

6.1.10.1 Categories of Finance

The Centre faces two different financing problems. The first is associated with the founding of the institution and the second with its sustenance after it has been founded. It is recommended that the Centre's financial policies be relatively conservative. The Centre should establish:

1. An operating budget: The operating budget should be based on a large variety of sources and not on any one large contribution.

2. A Trust Fund: Substantial non-recurring donations should be deposited in a Trust Fund. The Centre should build up the Trust Fund to a level that normal income from these investments can meet all the permanent commitments of the Centre. This may be a figure of the order of 30% to 50% of the operating budget.

3. A Capital Fund: Initially, it may be desirable for the Centre to utilize prefabricated and/or rented temporary facilities. But once the Centre's operations become stable and an agreeable location found, it may be useful to consider permanent structures. For this a substantial investment may be needed. Other capital investment must be made in the library and computer facilities of the Centre.

   It is recommended that all capital investments be associated with deposits in the Trust Fund. A wise financial policy requires that these deposits be equal to ten times the expected annual operating cost of the new facilities. A common problem of institutions is the under-estimation of the financial obligations incurred by new facilities.

6.1.10.2 Sources of Finance

The Centre should seek to diversify the sources of its income. The following sources should be vigorously tapped:

1. Fees from states and institutions that are chartered members: An annual fee should be paid by all states or institutions that accept to be chartered members of the Centre. All Arab States, the regional development funds, and the Arab League are potential contributors. This income should be committed towards the operating budget.

   These fees will cover the cost of services the institution would render on a routine basis to users under the Permanent Programme. The annual membership fee may be the same for all members and set

at £ 100,000; it could also be on the Arab League scale utilized for computing national commitments. Furthermore, special considerations may be given to states that may be unable to cover their fees.

2. Income from services rendered: The Centre should be authorized to be paid for projects it undertakes. General consultancy contracts with specific ministries may be a mechanism for rendering services and generating income during the first few years. Income from this source should become significant in the third year and by the fifth year this should account for possibly 80% to 90% of the operating budget.

3. Grants and donations from national governments and regional institutions: At the time of founding, a minimum of US. 50(A)/125(B) million should be sought to provide the income to cover the operating funds and the beginning of a Trust Fund for the first five years.

6.1.10.3 Minimal financing

Unfortunately the cost, value and importance of high quality services the Centre is expected to provide are not generally appreciated. Thus some may be provided at a lower cost. Elsewhere in this report it was observed that this Centre is expected to cope with the problems associated with technological activities involving considerable expenditures. The feasibility and engineering studies involved in executing these projects and the licensing fees paid amount to something in the neighbourhood of US. 6 billion annually. The cost of the proposed Centre (level B) is roughly 0.3% of the latter fees and 0.01% of the volume of the projects. It is most likely that the Centre could contribute knowledge and services that will enable the Arab States not only to economize on these expenditures but, equally important, also to effect a more systematic and balanced programme of technology change. The latter will have a major impact on employment, the development of national institutions, self-reliance, self-sufficiency and industrialization.

Given this background the proposed budget is not excessive. However, if it is not possible to raise the funds and to provide the necessary financial security it is recommended that the Centre not be established. The alternatives consist of: (1) expanding the existing institutions and adapting them to provide some of the proposed services; (2) prolonging the preparatory period until the necessary funds are secured.

It would be most desirable if at the time of founding, the sum of US$ 50(A)/125(B) million is raised. The estimated expenditure and revenue during the first five years are shown in Table 5.

TABLE 5

	Expenditure US$ million		Income Generated	
	A	B	A	B
Pre-founding period	0.5	0.5	0	0
First year*	3	7	0	0
Second year	3	16	2	5
Third year	10	25	4	15
Fourth year	10	25	8	22
Fifth year	10	25	10	25
Total	36.5	98.5	24	67

* US$ 1(A)/3(B) million are budgeted in first year for the library

A large number of suggestions to reduce the initial funding may be thought of. The most obvious would be to raise only US$ 13(A)/25(B) million which, with the revenue generated from such a Fund, would be adequate to meet the deficit indicated in Table 5. Such an approach will be unacceptable because such a Fund will not provide the essential security and stability that the institution requires during its first five years. The purpose of the recommended level of funding is precisely to help overcome endemic institutional insecurity. Though the Centre should aim at attaining a state of full self-financing in its fifth year, nevertheless it should have the security that the non-attainment of such a goal will not render it insolvent.

6.1.11 Location of the Centre

The Centre should be located in a country and a city that provides a number of facilities and services, and that guarantees freedom of action. There are four aspects to this matter:

1. Factors that are important to the Centre.
2. Factors that are important to the staff.
3. Factors that are important to the users.
4. Factors that are important to the host country.

Under each, there are factors that are essential and others that are desirable.

The legal status of the Centre and the priviliges enumerated below are based on those generally accorded UN agencies and institutions of the Arab League in the Arab States.

The ultimate choice of location by the Governing Board will necessarily depend on a careful analysis of the available options: it is to be expected that a compromise will have to be sought.

6.1.11.1 The Centre

Primary Factors

The host country must be able to guarantee that the Centre and its staff shall have:

1. The privilege of political neutrality in all Arab affairs.
2. Freedom of information: the Centre should be able to acquire information and be free to hold it in its library.
3. The right of the Centre to own property in the country.
4. The waiver of duties on all of the Centre's imports and on the salaries of the staff.
5. Freedom of movement of the Centre's staff, such as absence of visas both for entry or exit for the Centre's staff, whether nationals of the host or of other Arab States. This may be achieved by the issuing of long term multiple entry visas.
6. Genuine interest of the host government in technological development.
7. Availability of a variety of schools of high quality for the staff's children.
8. Availability of high quality medical services.
9. Availability of good quality staff housing at reasonable cost in the range of US$ 3,000 for a 4-bedroom unfurnished house or apartment.

10. Excellent postal and telecommunication facilities: cables, local and international telephone, telex lines, efficient mail deliveries.
11. An efficient and well connected airport: the users of the Centre and the staff will need to travel extensively.
12. Hotel facilities: since the Centre will have a large number of guests and conference participants it will be necessary to find adequate accommodation at short notice.
13. No interference, direct or indirect, in the process of staffing f the institution.
14. Honouring the full rights of the staff under the civil and criminal codes of the host country. The Centre's legal council should have the right of access to any staff member under arrest for whatever reason.

Secondary Factors

1. Good local computer facilities.
2. Availability of well trained local personnel for office work: the Centre will be in need of a large number of French and English-speaking expert typists and secretaries, professional librarians and librarian aids, etc. The importance of all such staff will add substantially to the cost.
3. Reasonable cost of living: an unusually high cost of living implies higher wages and higher costs.
4. Recreational opportunities for staff and their families.
5. A pleasant climate and a pleasant environment: numerous such locations exist in the Arab States.
6. The location in a university town.

6.1.11.2 Users

Since the Centre is regional, it should be open and accessible at all times to all Arab States. Thus the host country must provide adequate guarantees that the Centre will always be accessible to other Arab nationals. It should be possible for any staff member of an Arab ministry or organization to gain entry to the host country without prior arrangement or visas.

6.1.11.3 Staff

Several of the factors that are critical for the staff have been listed under those factors that are essential for the establishment of the Centre. These include: housing and medical facilities, schools, recreation. These factors are so critical that if they are absent, expensive programmes must be made to provide them. Otherwise, it is most unlikely that the Centre will have freedom of access to the manpower it needs.

However, an essential condition for the development of a permanent senior staff is the right of a staff member to own his home and to retain ownership after resigning from the Centre. It should be possible for a staff member, after resigning from the Centre, to accept employment at other institutions in the host country or to engage in lawful private business.

Some, if not many, of the professionals that will serve on the staff of the Centre will also have a husband/wife who is also a professional. Thus it should be possible for the wife/husband of the staff member and their dependents to be employed.

The staff should be able to receive and transfer their earnings into any other currency; thus they should have access to appropriate banking facilities without excessive red tape.

6.1.11.4 Other factors

It is also useful to consider non-capital cities among the likely sites. Most Arab capital cities are very congested today and the cost of living is high. Towns, to quote some examples only, such as Fez, Mosul, Tripoli (Lebanon), Alexandria, Aleppo and several others offer some interesting possibilities.

6.1.11.5 Discussion

It is clear from the factors that have been listed that some may be satisfied by considerable capital investment: a school, a small hospital and such facilities. This, of course, will be far less satisfactory than already existing facilities. But other problems connected with the political and social environment of the institutions cannot be so easily met.

It is recommended that the choice of the location be made by the Governing Board after the institution has been funded. Careful study of a number of likely locations should be undertaken together with detailed discussions with potential host governments to determine the nature of the status that may be granted the Centre.

6.1.12 Manpower, Staffing and Consultants

The effective governance, management, planning and programme management depend on a relatively small number of individuals (some 25 to 35 persons excluding the Governing Board). Highly experienced Arab nationals with the appropriate background now exist. The selection of the senior and critical staff should be performed with considerable care. Professional competence should be a necessary pre-condition. This competence should be established critically by actual examination of the published, unpublished and occupational record of the candidate. Equally important criteria are the ability of the person to work effectively in groups, his (or her) group behaviour, his (or her) management skills and behavioural patterns under stress. In this evaluation great care should be exercised when individuals are considered for an appointment who worked and lived in radically different social and institutional environments.

It should be possible to select this small number of professionals from about 1,000 candidates. It is recommended that this process be carried out through intensive interviews, review and study of professional records and assessment of group behaviour. This sub-group of the Centre's staff is critical to the successful establishment of the institution.

The professional staff of projects will consist of consultants and permanent staff members. Some of the individuals examined for senior positions may qualify for staff jobs. Here again, the Centre should be able to select its 100 to 250 professional staff from amongst 10,000 technically qualified persons. In order to meet its staff needs and have access to the large Arab high level manpower pool in and out of the Arab world, the Centre should establish its own brain bank.

Specialized manpower of the type needed by the Centre cannot be judged adequately from reading curriculum vitae, letters of recommendation or short interviews. It is recommended that the Centre combine three activities to enhance its communication with Arab professional manpower through:

1. Seminars: the Centre should utilize the recommended seminar and workshop programmes to study and assess individual experts. In addition to the training programmes discussed under 6.1.2, the Centre should organize regular one-lecture seminar activities. This need not be an expensive programme; professionals travel a great deal. Many of them would also like to visit the Centre. In return for a per diem and a modest honorarium of, say, US$ 100.-, it should be possible to sustain quite an intensive lecture series. A great deal may be learnt about a person's specialization, methodology, reliability, scholarship, personality, etc, in such a one day visit.

2. Conferences: the Centre's four or more annual conferences will also attract a large number of participants and thus develop the Centre's exposure and communication channels with professionals.

3. Travel of the Centre's staff and their participation in conferences. All staff should be involved in this activity and this programmed travel should be included in every project staffing.

The selection of staff for each project should be carefully done in the light of their technical expertise, their personalities, and the nature of the project. Whenever a project of considerable duration is to be performed outside the premises of the Centre, care should be given to problems of housing, schooling, transport and health services.

The Centre should be relieved of the constraint of satisfying any geographical quotas in either staffing or the use of consultants. The Director should be concerned solely with providing the best services.

Naturally the staff and consultants of the Centre need not all be Arabs. A distinct preference should be given to Arab nationals because of the role this institution is presumed to play. However, at no time should the Centre compromise its performance because of such a policy.

Non-Arab professional manpower is available through a number of channels. It is recommended that the Centre seek the services of individuals possessing the requisite competence directly. The alternative is to secure these services through UN agencies or foreign consulting firms.

It is recommended that the Centre experiment with a variety of institutions and nationalities. The Centre should possess the documentation, expertise and imagination to examine a wide variety of cases.

6.1.12.1 Staffing and Career Structure

The association of a professional with an institution and the effect of this association on his performance is a subject that should receive the priority attention of the Director of the Centre. It is recommended that the Centre provide for above-average stimulating and professionally desirable working conditions. It should avoid by all means attracting persons on the basis of high remuneration or over-bidding. The salary scale should be competitive and equal to prevalent rates. What the Centre should concentrate on as its central attraction are the opportunities for professional development and self-fulfilment. The management and operations of the Centre should be such that an unqualified or disinterested person cannot go unnoticed; he will either promptly resign or be terminated. A competent, energetic and productive staff member, on the other hand, will recieve explicit recognition. All reports and studies should be authored and the work of all staff and consultants be explicitly recognized. This type of organization cannot flourish unless the Centre attracts individuals who are as concerned with the research activity and the discovery of solutions as the institution itself. Given a reasonable salary scale the reward of such staff is the successful solution of problems and professional achievement.

Substantial numbers of highly qualified professionals do not possess managerial qualities. It is very important that the lines of the career structures available at the Centre should not favour managerial posts. It should be in principle possible for senior staff members to receive salaries comparable to those of the most senior managerial officers (Chiefs and Director).

The initiation and development of an institution is a most delicate process. Any instability of the organization and any serious setbacks in the unfolding of its programmes may have serious long range effects. It may result in the loss of enthusiasm and commitment, the weakening of leadership and management control, loss of staff discipline, loss of competent staff and so on. The performance of an institution of this sort is determined by a combination of high powered intellect and idealism. The type of individuals required to make a success of such an institution are in short supply in any country. They have numerous employment opportunities. Unless the Centre provides adequate working conditions, sound and principled management, intelligent and rational programme planning and management, it is not likely to attract or retain the services of the crucial manpower that are necessary for its success.

6.2. Short and long-term objectives

The functions recommended for the Centre will most probably be in great demand in the Arab world for at least two decades. It is not thought useful to speculate in this Report for the period after 1990.

6.3 Detailed Budget

It is not thought useful at this stage to prepare a detailed budgetary breakdown. The estimates given should be adequate for the present phase of the discussions and deliberations. It will be possible to prepare a useful detailed budget once the location has been selected and salary scales established.

7.0 Draft Work Programme

The definition and discussions presented in Section 6.0 of this Report are sufficiently detailed to constitute the basis of a work programme for the first five years. But for the purpose of completeness a draft work programme for the first five years is presented. It is recommended that the Director be solely responsible for the planning and management of the work programme subject to Board approval. It should be pointed out here that by the third year a considerable fraction of the Centre's activities should consist of contract projects paid for by Arab institutions. This implies that the work programme will become dominated by such contracts.

7.1 Sample of possible topics for study

1. Inventory of Arab institutions and programmes dealing with technology and technology transactions (first and second years).
2. Projects inventory to include: all on-going new projects with a value exceeding US$ 1 million; technical and financial details on each project. (on-going, permanent).
3. Inventory of all contracts under negotiation that involve technology transactions, to include contracts of US$ 1 million value and above. (on-going, permanent).
4. Field survey of the status of the civil engineering industry in the Arab world with a view to determining: the existing capacity of this industry, its shortcomings, and the practical steps that may be taken to expand its output, reduce unit cost, expand its engineering capabilities. (first year for 2 years).
5. Case studies of 100 different contracts and the negotiation strategies utilized (second year for 2 years).
6. The capacity of the traditional technologies in use in the agricultural, transport, construction and manufacturing sectors for rapid change (second year for 3 years).
7. The existing technological capabilities in the Arab world in the field of design and construction of petroleum and petrochemical installations (second year for 2 years).
8. Food collection, storage and distribution in the Arab world: food losses and the means to reduce them (second year for 2 years).
9. The detailed study of a sample of 100 different Arab institutions (first year for 5 years).
10. Cost structure of civil engineering projects (second year for 2 years).
11. Cost structure of Arab iron and steel industry (second year for 2 years).
12. Cost structure of Arab refineries (third year for 2 years).
13. Cost structure of Arab petrochemical industry (third year for 2 years).

14. Arab shipping fleets: economics and transport performance (third year for 2 years).
15. Land transport: economics and management (fourth year for 2 years).
15. Economics of Arab small rural towns (population 1000 to 5000) (fourth year for 2 years).
17. The Arab defence industry: technological and economic performance (second year for 3 years).
18. Alternative patterns for supplying Arab food supplies: (second year for 2 years).
19. Sub-contracting by international firms in the Arab world (first year for 4 years).
20. International contracting and procurement (first year for 4 years).
21. Technology transfer processes to Arab labour force (second year for 4 years).
22. Management and Economics of Arab harbours (third year for 3 years).
23. The production and diffusion of informaion in government bureaucracies (third year for 3 years).
24. Patterns of decision making as a function of type of contract, cost and the information base (second year for 3 years).
Licensing fees paid by Arab states (second year, on-going).
25. A study of the forward and backward linkages generated in key sectors of Arab economics: petroleum, iron and steel, cement, textiles, other. (second year for 3 years).

8.0 Action Programme for the Establisment of the Centre

If the concept of an Arab Centre for the Transfer and Development of Technology is accepted by a sufficient number of Arab States and regional institutions, a number of actions will be necessary to bring about the proposed Centre. It is obvious that the steps that have to be taken fall into three distinct phases. Phase One begins after the 5th Session of the Economic Commission for Western Asia in May 1978. In this phase a special follow-up committee should seek to attain in an orderly and effective manner two objectives: the establishment of the first Governing Board and the collection of the funds pledged for the Centre. Phase Two begins when the General Assembly and the Governing Board meet. Phase Three begins when the

first director of the Centre is appointed by the Board and assumes his responsibilities. These three phases are now discussed in greater detail.

8.1 Phase One

Expected duration: six months.

A follow-up committee of three full-time persons should be established at an official meeting of representatives of Arab States organized by ECWA. The functions of this committee should be to:

1. Prepare the Charter and all other legal documents for signature.
2. See to it that the documents are properly signed.
3. Receive the donations and grants towards the establishment of the Centre. The transfer of these sums should be to a special trust fund under the responsibility of the five Arab development funds. The General Assembly of the Centre becomes legally responsible for the Trust Fund at its first meeting.
4. Implement all the necessary steps for the creation of the first General Assembly and Governing Board.
5. Call for a meeting of the General Assembly.
6. Present a report on the events of this phase. The follow-up committee is then automatically dissolved.

End of Phase One.

8.2 Phase Two

Expected duration: six months

The basic functions of the General Assembly in this phase have to do with the completion of a number of important managerial and legal matters. These are to:

1. Elect the Governing Board and its officers.
2. Establish a full time secretariat of the Board.
3. Establish procedures and bye-laws to govern Board activity.
4. Define the legal status of the Centre and of future staff.
5. Sub-contract with a reputable firm the preparation of "job descriptions" and management guidelines defining:
   - the authority and responsibility of the Board, its officers and the Director. The emphasis here should be on the managerial relationship of the Director to the Board and its officers, as well as on the authority the Director must be granted to fulfil the objectives of the Centre;

- the explicit criteria and methods that will be used to assess the performance of the Director.

6. Develop detailed criteria and a negotiation strategy for the selection of the Centre's location.
7. Begin preliminary surveys and negotiations for comparing alternative sites.
8. Select location after arriving at a clear and comprehensive agreement on the status, privileges, responsibilities of both the Centre, its staff and host government. 1/
9. Establish a Finance Committee for the management of the Trust Fund.
10. Establish a Committee of the Board to search for a Director. This Committee should nominate its candidate(s) to the Board for final selection within six months.
11. Appoint an external auditor for the Centre.
12. Choose the location of Governing Board offices. This location need not be in the same city or country as the Centre.

Phase two ends when the Director is appointed and assumes his duties. It is assumed that by this time, the entire sum for the establishment of the Centre has been received.

8.3 Phase Three

Expected duration: one year.

During this phase, objectives are to be translated into detailed plans. Facilities, management procedures, accounting systems etc., have to be planned and implemented. Massive effort to establish substantial data banks and library facilities has to be made. In more detail:

1. The Director should identify and appoint a number of key staff members. All those holding senior management positions can only be appointed by the Governing Board upon the recommendation of the Director.
2. The Director should initiate planning the Centre's programme. A draft plan should be submitted within six months of the beginning of his appointment.
3. The Director, with the Board's approval, may initiate a few projects before the completion of the full programme.

1/ The General Assembly may decide that it should make the final decision concerning the choice of location on the basis of a recommendation submitted by the Governing Board. If the General Assembly so decides then it must schedule a second meeting to be held within one year.

4. The Governing Board may embark on a small programme of visits to individual Arab states and begin its own long term planning for the governance of the Centre.

Phase Three ends when the first programme has been submitted by the Director and approved by the Board.

Subsequent to Phase Three, the Centre should operate on the basis of programmes submitted by the Director and approved by the Board.

9.0 Concluding Remarks:

The performance of an organization is determined by a wide variety of factors. Although chance events play some role in the history of institutions, it is possible to limit greatly the risk by judicious planning. The Arab world has been, and will most probably continue to be, a region exhibiting intense political, social and economic activity. Not infrequently, political situations arise when intense polarization occurs leading to the institutional paralysis of regional institutions. In view of the certainty that the future will be no different from the present or the past it is recommended that a sine qua non for the establishment of this Centre is its depoliticization. A code of conduct should be prepared and modelled after those adopted by agencies of the UN and the Arab League. No officer of the institution should be appointed prior to the issuance of such a code and without his adhering to its terms. Violation of this code should result in automatic resignation or termination of a staff member. An independent neutral committee of reputed judges has to be appointed by the Governing Board to decide on marginal cases and to serve as a committee of ultimate appeal.

One of the most common causes for institutional breakdown arises from conflict between a governing board and the director of the institution. Guidelines for these procedures are discussed in Section 6.1.5. Thus, the Governing Board should determine its procedures and policies before appointing the first Director. Although the governing board of any institution is by definition the source of its ultimate authority, it is the Director who should be the sole instrument

of the Board for the execution of its institutional programmes. It is of the utmost importance to prepare and publish documents specifying the responsibility, authority and criteria for evaluation of the Director before his selection and appointment. Similarly, the Board should adopt bye-laws defining its authority and responsibility in every field of activity. The touchstone for sound institutional health is the unity between the Board and its appointed Director. This relationship should be explicit to guarantee that it remains friendly and co-operative. It is equally important to observe that the Governing Board should not abdicate its responsibilities in the hope that the Director will fill them. It is crucial that both the Board and the Director fulfil their responsibilities integrally. The Board is the only authority that is responsible for a final assessment of the past performance of the institution and in modifying its policies accordingly. The Director will be too involved with the process to be able to take his distance and correct readily his course. This function of the Board should not be directed against the Director, but rather it should be supportive of his efforts. Another vital responsibility the Board must fulfil is the audit of both the programmes and accounts. The burden for fund raising for expansion and development must rest heavily on the Board.

But all of these are secondary roles of the Governing Board. Its fundamental purpose is to reflect, interpret and formulate social and economic demands of Arab society in terms of programmes and policies and to see that the Centre possesses the instrumentalities to implement its decisions. Unfortunately, boards are often thought of in terms of their "negative" aspects - as controllers and auditors - rather than as the authority responsible for directing the affairs of an institution and in providing it with the means to attain its objectives. A deep sense of responsibility and commitment amongst the Board members is required for an institution to succeed.

A Centre of the type proposed does not deal with the mass production or sale of physical commodities. It aims to use creative imagination and often

subjective professional expertise in the service of other public institutions. This poses a heavy ethical and intellectual responsibility on the institution and its staff. It is wrongly assumed by some that decisions and policies in science and technology are standardized and totally objective. This is far from reality. Honest mistakes occur costing billions of dollars; the element of chance and genius are also in evidence. Yet, given the proper institutional conditions it should be possible to institute adequate safeguards to reduce the risk of major error. If properly executed, the proposed Centre will be transmitting know-how, knowledge, data and specific recommendations. But this will not reduce the responsibility for caution. But even so-called "scientific" methodologies and conceptual approaches have their limitations and distorting effects.

The precise founding conditions determine the initial evolution of a new institution. Soon thereafter its output (determined by these initial conditions) becomes of growing importance in setting its trajectory.

APPENDIX I

Findings of Interagency Missions to the Arab States

Immediately after the Preparatory Interagency meeting of 24-28 October 1977, the missions experts from ECWA and the other participating agencies had extensive discussions and briefings (see 1.0). The ECWA Secretariat had already notified the relevant authorities in each Arab State concerning the missions and had requested appointments with government officials. It was unfortunately impossible to arrange for visits to Oman[1/] and Somalia. Otherwise, nineteen Arab States were visited. A total of 203 persons were met and 15 different persons participated on the teams of the missions.

The purpose of the missions was to acquire factual and attitudinal information on policies that bear directly on the acquisition of techniques, capital goods and products and the perception of technological problems and issues.

The Arab world was divided in two parts

Mission one: Lebanon, Syria, Jordan, Egypt, Sudan, Libya, Tunisia, Algeria, Morocco and Mauritania.

Mission two: Iraq, Kuwait, Bahrain, Qatar, UAE, Oman[1/] (not visited), Saudi Arabia, Yemen Arab Republic, Djibouti, Somalia (not visited) and People's Democratic Republic of Yemen.

The date each country was visited, the names of the visiting team members, and the officials met are given in Appendix II.

During the fifty days of these visits, the teams sought to acquire answers to questions of importance to the design of the Centre. A summary of these findings is presented below. It does not exhaust the impact of the findings of the field missions on this Report. In fact the definitions of the functions of the Centre and the recommended organization and governance depend heavily on the comments of the respondents.

Summary of the basic findings of the two missions

In summarizing the findings of the two missions, it was not deemed useful to specify the sources of the views expressed.

1/ Oman was later on visited by the team leader of the second mission.

Attitudes towards concept

The overwhelming majority of the persons interviewed were in favour of the concept of establishing an Arab Regional Centre for the Transfer and Development of Technology. However, the support the concept received was tempered by a number of major or minor reservations and concerns. These concerns had to do with the quality of the work to be undertaken, the possibility of creating an effective Centre, the avoidance of duplication and the relationships between the proposed Centre and national institutions.

On a number of occasions, officials were concerned with whether the development of national centres should precede the establishment of a regional centre. Here a number of contradictory positions could be identified: for some officials, gaps in the capabilities of existing institutions constitute the only justification for a regional centre; yet for others, unless all institutional gaps are filled on the national level "The co-ordinating role of the regional centre, which should be its priority function, will have little substance", (to quote one of the country reports). The officials of two countries expressed strong reservations: in the first country, these reservations were based on the fact that industry was totally in the private sector; in the second country, the reservation was based on their observation that the performance of Arab regional institutions has not so far been effective.

Linkage to national institutions

Several of the Arab States had already established a number of institutions to cope with a variety of scientific and technological problems. In all of these countries the importance of effective relationships between the national institutions and the proposed Centre was emphasized. It was argued that the communication between the proposed Centre and the national institutions should be at the highest level. Among the services, the Centre should provide these national institutions with information, advice, training and assistance in institution building.

Countries that have not yet established an adequate system of institutions believed that the proposed Centre could provide them with valuable services on a problem-by-problem basis. (The priority functions are discussed below).

The proposed Centre was called upon to prepare comprehensive information on science and technology institutions in the Arab world and to contribute to a more effective utilization of existing institutions.

Access to the services of the proposed Centre

The need for simple and effective mechanisms through which individual Arab States and national institutions can communicate with the proposed Centre was emphasized.

Countries where R&D is very limited or non-existent appeared worried about their chances of interacting and communicating with the proposed Centre. Some of the interviewed officials stressed the difficulties met by regional organizations in securing information from member states. Furthermore, there was some dissatisfaction with the type of information governments receive from regional and international organizations.

Officials in countries with developed institutional infrastructure emphasized the need to channel communication through national centres.

Communication was suggested to be in two ways: either initiated by institution(s) in each Arab State; or initiated by the proposed Centre. Furthermore, the publications and data banks themselves will be sought after by "users" without the assistance of the Centre's staff.

Overlap, Co-ordination and Duplication

The problems of duplicating existing (e.g. IDCAS) or planned institutions and of co-ordinating existing activity were repeatedly stressed. It was realized by the officials that there was a need for additional institutions. In particular, the Centre to be established by the Economic Commission for Africa, the proposed Euro-Arab Technology Transfer Centre as well as the institutions and Fund for Scientific Research recommended by CASTARAB were discussed in relation to the proposed Arab Regional Centre for the Transfer and Development of Technology.

It was generally agreed that the proposed Centre could render a useful service by contributing to the co-ordination, integration and mobilization of existing institutions - whether international, regional or national.

It was emphasized that national centres are essential to the technological development of each country. The proposed regional Centre can only play an advisory and supportive role to national centres.

Range and diversity of Arab technology needs

A number of officials emphasized the immense differences in the social, economic and technological needs of the different Arab States as well as of the differences in their absorptive capacity for technology. A number of suggestions were made on how the proposed Centre could cope with this problem. It was not deemed necessary or useful that all Arab States participate in all programmes. It was proposed that sub-regions, or a group of countries facing similar problems, may have specifically designed programmes.

It was clear that most officials appreciated the wide range and diversity of problems that should be of concern to the proposed Centre. On the other hand, it was realized that the proposed Centre must specialize and could not endeavour to meet all the expressed needs.

The complexity of this problem may be seen in the observations made on the subject of training. Most officials indicated the need for this service and discussed briefly their needs. These needs ranged from vocational training of agricultural extension workers to specialized training in policy formation with particular emphasis on medium level training.

It is clear that one of the challenges facing the proposed Centre is the development of a strategy that succeeds in providing tailored services, yet the Centre itself is not directly responsible for performing the detailed works on the national level. A close co-operation between the proposed Centre and national institutions within the framework of imaginative strategies may hold the key.

The functions having the highest priority

One of the basic objectives of the two missions that visited the Arab States and consulted with responsible government officials was to secure as accurate an opinion as possible on what functions are deemed to be the most urgent and needed at this time. This information is important at the planning stage because the Centre must be established to provide services in actual demand. Naturally, the assessment of the situation and the interpretation of interview statements in such a broad field are subject to both error and the bias of the interviewer. Notwithstanding all of these difficulties one is pleasantly surprised to note considerable unanimity on the subject of the priority functions.

At the Preparatory Interagency Meeting on the Arab Centre for the Transfer and Development of Technology (E/ECWA/NR/9, October 1977) the experts identified functions (modules) 1, 7 and 9 as having the highest priority (A) and functions (modules) 10 and 11 as having the next highest priority (B)[1]. The missions country reports have addressed themselves to this problem of priorities of functions. The definition of the functions do not always correspond exactly to those in the Working Paper. However, if one takes function 1 to include licensing agreements, contract design and negotiations, function 10 to include a wide variety of "tailor-made" information services, and function 8 to cover training on virtually all levels, the country scores are as entered in Table 6. The scores presented in Table 6 are computed by allocating one point to each country for each of three choices. Since 19 countries responded to this topic, the maximum expected score should be 57 and the maximum score per function 19. The score in Table 6 adds up to 48 because some of the functions selected fall under the "Permanent Programme".[2] The functions listed under the "Permanent Programme" received heavy emphasis.

T A B L E 6

The rating of the eleven basic functions of the proposed Arab Regional Centre for the Transfer and Development of Technology

Functions (Modules)	Preparatory Interagency Meeting Ratings	Country Scores
1. Policy Design	A	9
2. Project Support	-	1
3. Technological Transfer to the Traditional Sector of the Economy	-	-
4. Sectoral Emphasis	-	3
5. Support Services to Technology Users	-	-
6. Development of Appropriate Technology (hardware R&D)	-	-
7. Regulating the Inflow of Tools, Techniques and Technology	A	-
8. Research and Training	-	11 (training only)
9. Co-ordination and Integration	A	6
10. Information Transfer	B	14
11. Development of Appropriate Technology	B	5

1/ See Table 6

2/ The "Permanent Programme" referred to as the "Core Programme" in earlier versions covered the following activities in the Working Paper: Seminars and Advanced Training; Conferences; nomination of Consultants; Institution Building; Preparation of Request for Proposals and Unsolicited Research.

In the mission evaluation of the responses of officials there was considerable overlap between functions 1 and 7. On the other hand, function 8, when discussed during the first interagency meeting, received considerable attention regarding training. Research was not deemed to be essential to this function. This accounts for the apparent differences between the two assessments of priorities.

Though most officials interviewed were concerned with co-ordinating and integrating the activities of existing institutions, yet when these were asked to select the three most vital functions, module 9 was given a relatively lower rating. It should be noted here that there is some difference between conception and scope of co-ordination and integration as reflected by the officials interviewed and the functions noted in module 9 (See Working Paper, Para 6.2.9). In most cases, the officials emphasized the need to co-ordinate the activities of national and regional centres of technology. In module 9, it is proposed that the Centre under consideration should go beyond this limited institutional framework. For example, the Centre may contribute to the co-ordination and integration of a broader set of institutions as well as contribute analysis and studies of development plans with a view to the integration of existing Arab sources of technology with requirements. This latter activity was discussed by some respondents as part of function 1.

A careful synthesis of the discussions, observations and analyses, the mission teams indicate that the priorities emphasized, in addition to those enumerated under the "Permanent Programme," consisted of:

1. Information services designed to address complex and sophisticated problems. In other words, a service moving beyond documentation and closer to a pre-feasibility service in some cases.
2. Policy design with special emphasis on services in support of: contract negotiations, licensing, project design, technological development policies.
3. Training programmes and assistance with institution building.
4. Co-ordination and integration.

5. Development of appropriate technology (function 11): The establishment of detailed criteria for the assessment for appropriateness of new technologies whether generated in the Arab world or imported; the development of methodologies for the generation of appropriate technologies at existing R&D Centres in the Arab world; the study of the implications of specific appropriate technologies to public policies in the field of investment, trade, education, labour; the critical assessment of what is happening in the Arab world in the field of technology; the study of successful examples of appropriate technology throughout the world; the diffusion of this information in the Arab States.

Considering the strong overlap between the considered opinion of the experts at the Preparatory Interagency Meeting (October 1977) and the strong avoidance of functions listed under 2,3,5,6 as well as the limited emphasis on function 4 leads us to plan the feasibility study on the basis of the five above mentioned priorities. Later in the report these functions will be redefined in the light of the findings of the missions. Further discussion and analysis of these functions will be deferred to later sections of this report.

Priority Technologies

The missions attempted to solicit opinion on the priority technologies that should be emphasized by the proposed Centre. Food and Agriculture were the topics most cited. However, different officials emphasized different aspects of these technologies ranging from mechanization of agriculture to land reclamation.

In the mining and industrial sector, petroleum and petrochemicals naturally led the way among the major topics. Textile industries, iron and steel, pharmaceuticals, construction materials, hydro-electric power, engineering industries received scattered interest. Research in solar and nuclear energy sources was also considered by some to be of prime importance.

It was not clear from the discussions whether the respondents thought the proposed Centre should engage in research work in these technological fields or should provide supportive policy planning services to institutions and governments in the region. The high cost of physical and hardware research was pointed

out in the Working Paper and the initial scale of the proposed Centre could not permit significant activity in hardware and physical research and development. Initially, the expectation was that such activity will be undertaken in existing and new specialized national and regional institutions. The proposed Centre could, however, provide valuable services in planning such new institutions.

Dissatisfaction with existing regional institutions and the desired quality of work

In a number of quarters, criticism of the performance of existing regional centres was voiced and officials intimated that their support of the concept will depend on the quality and standards of the work produced at the proposed Centre. Here a number of observations were usually made concerning the governance, staffing, financing and independence of the proposed Centre.

A few respondents urged that a study of the causes of the presumed poor performance of existing regional institutions be included in the feasibility study. Others suggested that a detailed survey of the performance of existing institutions should be the priority task of the proposed Centre.

Arab brain drain and the proposed Centre

A number of comments were made on the role that the proposed Centre may play in reversing the continuing Arab brain drain.

Financing the Centre

Comments on the financing of the proposed Centre were expressed in a number of countries and by officials of some of the Arab funds and national development banks. In view of the scale of Arab purchases of capital goods and technical services, and the size of the development budgets of most Arab States, the financing of the proposed Centre was not expected to pose serious obstacles. In fact, a number of responsible officers intimated that their organization would be agreeable to providing substantial support.

Some quarters argued that the proposed Centre should not be tied to the Fund for Scientific Research now in the planning phase because of the delays this may entail. However, the activities proposed for the Centre will not involve scientific research into either pure or applied science but will rather fall in the areas of policy planning, contract negotiations, project

design and the like. Thus it is unlikely that the policies of the proposed Fund would support the Centre's activities. Needless to say, the Fund for Scientific Research and the Centre can play mutually reinforcing, complementary and non-overlapping roles.

Financial stability and autonomy as well as the sources of finance and its relationship to location and governance received limited attention. Some observed that the location of the proposed Centre should not be determined purely by the financial contribution of a single state.

The respondents also raised a number of issues concerning whether the services rendered by the Centre will be free or paid for on a cost recovery and not profit making basis.

Location of the Centre

A number of officials expressed some observations on the choice of location. The availability of qualified and experienced human resources, the independence of the Centre, the ease of communication and travel were cited as important factors in the selection of the location.

Governance and management

The attitude of most of the officials who addressed themselves to this topic appeared to favour the establishment of an independent Centre, the management and staffing to be completely on the basis of competence and not on national quotas. A number of models and mechanisms for the overall governance of the Centre were suggested. For example, the AFSED and OAPEC models were cited by some. Others suggested that representatives from the national technology centres constitute the governing general assembly and that this body elect an executive committee. It was felt that voting rights in the governing body should not reflect the level of financing. For this reason some respondents felt that there should be considerable diversification in the sources of income and long range financial stability to endow the proposed institution with the requisite managerial autonomy.

It was generally believed that the proposed institution should be sufficiently autonomous to take initiatives, to plan, to execute its programmes and implement its own policies. These characteristics were deemed essential to the success of the concept.

The name of the Centre

The name of the Centre is long and cumbersome and not a few individuals found fault with the use of the word transfer. It is recommended that the Centre be named after one of the great practical engineers of Arab science. However, this matter should be left to the founding governing body.

APPENDIX II

LIST OF INSTITUTIONS AND NAMES OF OFFICIALS

VISITED BY MISSIONS IN THE ARAB COUNTRIES

ntry and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Office represented
ERIA	Mr. M.T. Muntassir Mr. M. Saad	Mr. M. Fasla	Director, International Relations, Ministry of Foreign Affairs.
1 December 1977	Mr. K.A. Sabet	Mr. M. Isly	Director, National Institute of Industrial Productivity and Development (INPED)
		Mr. K. Belhocine	INERI, Ministry of Light Industries.
		Mr. M. Belkacemi	External Relations, Ministry of Foreign Affairs
		Mr. A. Benkalifa	INPED
		Mme Baya Ousmer	Director, National Institute of Standards and Industrial Properties (INAPI)
		Mr. Hacene	Ministry of Light Industries.
		Mr. Meghricha	Ministry of Light Industries.
		Mr. K. Faanouni	Ministry of Light Industries.
RAIN			
15 November 1977	Dr. T. Al-Khudayri Mr. Ismail Siam Mr. R. Faruqi	Mr. Saeed Ahmad	Director, Vocational Training Section Ministry of Labour and Social Affairs
		Mr. Yusuf Khaja	Director, Light Industries and Co-ordinator for UN Conference on Science and Technology. Ministry of Development and Industry (Light Industries Section).
		Mr. Dhafer A. Al-Umran	Director, Economic and Planning Affairs Ministry of Finance and National Economy.
		Mrs. Safa Daghir	Director, Cultural Affairs, Ministry of Education.
		Mr. Hasan Fakhro	General Manager of Bahrain National Oil Co., Co-ordinator of the proposed Bahrain Science & Research Center
		Mr. Yusuf Abdel-Rahman	Official, Bahrain National Oil Co.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Office represented
REPUBLIC OF DJIBOUTI	Dr. M.S. Fayyad	H.E. Hasan Goled Aptidon	The President
7-10 November 1977	Mr. S. Al-Ammari	H.E. Ahmad Dini	The Prime Minister
	Mr. Ismail Siam	H.E. Abdullah Mohamad Kamel	Minister of Foreign Affairs
		H.E. Idris Farehi	Minister of Agriculture and Animal Wealth
		H.E. Mohammad Jamea Olabi	Minister of Trade, Communications and Tourism
		H.E. Ali Mohammadi	Minister of Industry, Power and Water
		Mr. Ibrahim Ali Hamed	Director of Prime Minister's Office
		Mr. Francois Fichant	Director of College Technique
		Mr. Robert Ferry	Acting Director of Geological Research Centre.
EGYPT	Mr. M.T. Muntassir	H.E. Dr. Moustapha Kamal Helmi	Minister of Education and Scientific Research
17-25 November 1977	Mr. M. Saad	H.E. Dr. Mouhamad Abdul Mouneim Abu Al Azm	President of the Academy of Scientific Research and Technology
	Mr. A. Shuman	Dr. Mouhamad Kamal Mahmoud	Director of the National Research Centre
	Mr. K.A. Sabet	Dr. Mahmoud Ali Hassan	Chairman, Building Research Council of the Academy
	Mr. M. Soubra	Dr. Abu Al Foutouh Abdullatif	Secretary General of the Academy
		Dr. Ahmad Mouhamad Gad	Supervisor, National Information and Documentation Centre

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or office represented
EGYPT (cont'd)		Dr. Ahmad Samih Al-Noukrachi	Supervisor on R & D activities in the Academy
		Dr. Abdel Fattah Rezek	Supervisor on scientific relations (Academy)
		Dr. Mouhamad Hassan Fadl	Director, Industrial Research Programme of the Academy
		Dr. Mouhamad Hilal	Member of the Technical Office of the President of the Academy.
		Dr. Othman Mohamed Jalal	National Research Centre.
		Dr. Youssef Moursi Hussain	Director, Research Policy Unit of the Academy
		Dr. Ibrahim El Ghatwari	Under Secretary for Planning, Ministry of Agriculture.
IRAQ	Dr. T. Al-Khudayri	Dr. Taha El-Naimi	President, Technology University
2-7 November 1977	Mr. A. Kecherid	Mr. Rajih Mohi-El-Din	Director-General, Department of Design, State Organization for Oil Projects
	Mr. F.J. Pidgeon		
	Mr. Ismail Siam	Mr. Ismail Alwan Al Dulami	Director-General, Manpower and Education Section Ministry of Planning.
	Mr. R. Faruqi	Mr. Bahjat Abdul-lah El Ani	President, State Organization for Industrial Design and Construction.
		Mr. Osama Hamadi	Engineering Manager, Petrochemical Industries, State Organization for Industrial Design and Construction.
		Mr. Adnan A.M. Al-Ani	Head, Petrochemical Industrial Department, State Organization for Industrial Design and Construction.

Country and date	Members of UNIDO/WA Interagency Mission	Officials met	Institutions or Office represented
IRAQ (cont'd)		Mr. Mohamad Idris	Chief Engineer State Organization for Industrial Design and Construction.
		Mr. Farhang Jallal	President, State Organization for Industrial Development.
		Mr. Ismail Bazzaz	President, Specialized Institute for Engineering Industries.
		Dr. Taoma El-Bander	Acting Director-General, The Scientific Research Foundation.
		Dr. Ghazi Darwish	Professor, University of Baghdad and Head, Transfer and Technology Unit, The Scientific Research Foundation.
		Dr. Rauf Zainul-Abideen	Director, Industrial Research, The Scientific Research Foundation.
		Dr. Mahmood Clor	Director, Agricultural Research, The Scientific Research Foundation.
		Dr. Adnan El-Adeeb	Director, Building Centre, The Scientific Research Foundation.
		Dr. Nouri Abdel Kader	Director, Natural Resources Applied Research Institute, The Scientific Research Foundation.
		Dr. Salman Rasheed Salman	Assistant Professor, Baghdad University and Official, The Scientific Research Foundation.
		Miss Ibtisam Al-Khalili	Transfer Technology Unit, the Scientific Research Foundation.
		Dr. Sabah Kachichi	Senior Consultant, Ministry of Planning: Industry Section.
		Dr. Jaffer Abdul Ghani	Senior Adviser; Ministry of Planning: Industry Section
		Mr. Mehdi Habib	Acting Secretary-General and Head of Technical Services, Organization of Specification and Measurement (Bureau of Standards).

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
IRAQ (cont'd)		Mr. Mahdi Al-Orfali	Chief of Administration and Finance, Organization of Specification and Measurement (Bureau of Standards)
		Mr. Farid Succar	Head Specification Department, Organization of Specification and Measurement (Bureau of Standards).
		Dr. Abdul Wahab Al-Dahiri	Director, Economics Department; Higher Council of Agriculture.
JORDAN	Mr. M.T. Muntassir	Dr. Albert Butros	Director General, Royal Scientific Society
11-16 November 1977	Mr. M. Saad	Dr. Hashem Dabbas	Under-Secretary, Ministry of Trade and Industry
	Mr. F. Hilmy	Dr. Ziad Annab	Director-General, Industrial Development Bank
	Mr. A. Shuman	Dr. Abdullah Al-Khatib	Director, Planning and Development Department, Royal Scientific Society.
		Mr. Ali Dajani	President, Chamber of Industry
		Mr. Jawad Al Anani	Under-Secretary, Ministry of Labour.
		Mr. Samir Ramadan	Royal Scientific Society
		Mr. Shafic Al Husseini	Ministry of Agriculture.
		Mr. Sami Al Sunnah	Deputy Director General, Agricultural and Land Organization.
		Dr. Hanna Audeh	President of the National Planning Council
		Mr. Ibrahim Fakhess	Director, Department of Chemical Industries.
		Mr. Souheil Al Mallah	Administrative Director, Ministry of Trade and Industry.
		Mr. Mohammad Al Sakkaf	Director, Economic Co-operation Department; Ministry of Trade and Industry.

ry and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
(cont'd)		Mr. Mu'auia Al Khammash	Director, Companies and Commercial Registration Department.
		Mr. Salah Ali Rida	Director, Department of Commerce; Ministry of Trade and Industry.
T	Dr. T. Al-Khudayri	Dr. Fikri Khalaf	Director, Technical Co-operation Department; Ministry of Planning.
November 1977	Mr. R. Faruqi	Dr. Mohamed Shanna	Technical Expert responsible for United Nations project; Ministry of Planning
	Mr. S. Al-Ammari	Miss Marian Al Awadi	Technical Co-operation Department Ministry of Planning
	Mr. A. Kecherid	Mrs. Makkiya Dashti	Technical Co-operation Department Ministry of Planning
	Mr. Ismail Siam	Mr. Daoud Hamman	Responsible for United Nations experts ; Technical Co-operation Department, Ministry of Planning.
		Dr. Adnan Shahabuddin	Director-General, Kuwait Institute for Scientific Research (KISR).
		Dr. George Abid	Special Adviser to Director-General; KISR
		Dr. Al Omar	Director of Research; KISR
		Dr. Abzal	Director, Science & Technology Policy Division (STP Division); KISR
		Dr. George	Techno-Economic Section, STP Division; KISR
		Dr. Ghanim	Techno-Economic Section, STP Division, KISR
		Dr. Mohamed Zuheri	Director, Documentation and Information Divisions; KISR
		Dr. Nabil Al Yassini	Researcher, Engineering Department; KISR
		(Also met staff working on petrochemistry, agriculture and solar energy projects).	

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
KUWAIT (cont'd)		Mr. Ahmad Al-Adasani	Director, Water Resources Development Centre, Ministry of Electricity and Water.
		Dr. Mohamamed Wasil Al-Thaher	Dean, Science Faculty; University of Kuwait
		Dr. Abbas Ali Khan	Assistant Dean, Engineering Faculty, University of Kuwait.
		Dr. Saad Al-Rulla	Dean, Engineering Faculty; University of Kuwait
		Mr. Kajeeb J. Al Foraih	Director of Industrial Development & Consulting Bureau; Ministry of Commerce and Industry.
		Dr. Ahmed Mohamed El-Behery	Technical Adviser (UNIDO); Ministry of Commerce and Industry.
		Dr. Fouad Abdullah	Director, Economic Department; the Industrial Bank of Kuwait
		Dr. Ziad El-Taqi	Head, Economic Research Department; Industrial Bank of Kuwait
		Dr. Brinsley Sheridan	Manager, Corporate Planning and Development, Petrochemical Industries Company.
		Mr. Craig M. Houston	Economist. Petrochemical Industries Company.
		Mr. Abdullah Al' Juhaim	Petrochemical Industries Company
		Dr. Mahmoud Amin	Assistant Secretary-General, Technical Affairs. Organization of Arab Petroleum Exporting Countries (OAPEC)
		Dr. Abdul Aziz Al-Qatari	Adviser on Technical Affairs (OAPEC)

Country and date	Members of UNESCO Interagency Mission	Officials met	Institutions or Offices represented
...MO	Mr. M.T. Mantassir	H.E. Dr. Selim El-Hoss	The Prime Minister
-6 November 1977	Mr. M. Saad	H.E. Mr. Michel Doumot	Minister of Industry and Petroleum
	Mr. C. Baron		
	Mr. F. Hilmi	Mr. Ibrahim Kharma	Ambassador, and Director-General, International Relations, Ministry of Foreign Affairs
		Mr. Josef Naffaa	Director-General, National Council for Scientific Research.
		Mr. Elias Haalouf	National Council for Scientific Research
		Dr. Sabah Al-Hag	General Secretary, National Council for Development and Construction.
...LAYA	Mr. Mouhieddine Loubra	Mr. Ibrahim Idly	Resident Representative, UNDP Office, Tripoli.
-10 December 1977		Mr. Ahmad Sabi'	Deputy Resident Representative, UNDP Office, Tripoli.
		Mr. Mahmoud Balazi	Director, Technical Co-operation Department, Ministry of Planning
		Mr. Joumaah Galen	Engineer, Ministry of Planning and Member of the National Committee responsible for the preparation for the United Nations Conference on Science and Technology for Development.
		Mr. Faysal Zayed	Director-General, Industrial Research Centre.
		Mr. Abdel-Magid Ben Saad	Director. Agricultural Research Centre.
		Mr. Taher Shaglouf	Director, Planning Department, Ministry of Industry.
		Mr. Mahjoub Arayba	Chief, Technical Co-operation Division; Ministry of Industry.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
LIBYA (cont'd)		Mr. Mahmoud Al-Ziglaa'i	Chief, Follow-up Unit, Planning Department, Ministry of Industry.
		Mr. Karim Al-Firgiani	Director, Technical Department, Ministry of Petroleum
		Mr. Mohamed Khaled Sultan	Projects Unit, Technical Department, Ministry of Petroleum
MAURITANIA	Mr. M. Soubra	Mr. Moustapha Ould Abdel Rahman	Director-General, Ministry of Planning
12-14 December 1977		Mr. Baba Ahmedyeiea	Director-General, Ministry of Industry
		Mr. Diop Demba	Chief of the Training Division, Ministry of Agriculture.
MOROCCO	Mr. M.T. Muntassir	Dr. A. Zhiri	Chef de Cabinet and Chief of Scientific Research and Technology Division, Ministry of National Education.
11-16 December 1977	Mr. M. Saad		
	Mr. K.A. Sabet	Mr. Haddaoui	Chief of Training Division, Ministry of Transport and Equipment.
		Mr. A. Cherkaoui	Secretary-General of the State Department for Planning and Regional Development.
		Mr. J. Ouajjou	Secretary-General of the Ministry of Labour and Professional Training.
		Mr. Aloui Kacimi	Director-General of (SUBM) Beni-Mella Sugar Company.
		Mr. Hakkou	Ministry of Labour and Professional Training.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
SULTANATE OF OMAN 12-13 December 1977	Dr. T. Al-Khudayri	Mr. S. Barakat Al-Lamby	Director-General of Industry, Ministry of Commerce and Industry.
		Mr. Salim Mabi	Director-General, Economics Department, Ministry of Foreign Affairs.
QATAR 16-17 November 1977	Dr. T. Al-Khudayri Mr. R. Faruqi Mr. S. Al-Ammari Mr. Ismail Sian	A.- Interdepartmental Panel Meeting Consisting of:	
		Mr. Mohammad Y. Al-Ali	Director, Electricity Department and Focal Point for Euro-Arab Dialogue on Technology Transfer, Ministry of Electricity and Water.
		Mr. Lutfi El-Abed	Co-ordinator of United Nations Technical Assistance, Office of the Amir.
		Mr. M.H. Abdul-Sattar	Official, Industrial Development Technical Centre.
		Mr. Ismail El-Ghandour	Official, Industrial Development Technical Centre.
		Mr. Michael Farah	Official, Ministry of Industry and Agriculture.
		Mr. Ali Hanan Khalaf	Official, Ministry of Economy and Commerce
		Mr. Mobarak Rashid Al-Boannain	Official, Ministry of Foreign Affairs.
		Prof. Tahir A. Razek	Faculty of Education, Qatar University
		Dr. Ali A. Laz	Mathematics Department, Qatar University
		Mr. A. El Attrash	UNDP Representative to the Government of Qatar.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
QATAR (cont'd)		B.- Independent Meeting with:	
		Mr. M.N. Abdul-Sattar	Official, Industrial Development Technical Centre.
		Mr. Ismail El-Ghandour	Official, Industrial Development Technical Centre.
SAUDI ARABIA	Dr. M.S. Fayyad	Dr. Mohamed F. Khatrawi	Head, Industrial Research Department , Industrial Studies & Development Centre (ISDC)(Riyadh).
30 November - 4 December 1977	Mr. R. Faruqi	Mr. Nasser Al Munawar	Industrial Research Department; ISDC
	Mr. S. Al-Ammari	Mr. Ahmad Suleiman Bakr	Management Accounting Expert representing UNIDO; ISDC.
	Mr. A. Kecherid	Mr. Abdel Malek Farrash	Secretary to the Council of Ministers and Head of Technical Co-operation Division, Riyadh.
	Mr. Ismail Siam	Dr. Syed Bassam Jabr	Director, Industry & Commerce Department; Ministry of Planning, Riyadh.
		Mr. Rida	Under-Secretary for Economic & Cultural Affairs; Ministry of Foreign Affairs.
		Mr. Mansouri	Under-Secretary for Political Affairs; Ministry of Foreign Affairs.
		Mr. Ahmed Mohamed Ali	President, Islamic Development Bank (IDB)
		Mr. Saeed Ahmad Minai	Vice-President; IDB
		Dr. Ahmed Al-Shanti	Dean of Institute of Applied Geology, King Abdul Aziz University.
		Dr. Kamal F. Saad	Chief Technical Adviser (UNESCO) and Head Hydrology Department.

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
SUDAN			
25-29 November 1977	Mr. M.T. Muntassir Mr. M. Saad Mr. M. Soubra	Dr. Wadie Habashi	Chairman of the Board of the National Council for Research.
		Prof. Ahmed Abdel Rahman El Agib	President of the Council for Scientific and Technological Research - National Council for Research.
		Prof. Mohamad Osman Khidir	Secretary-General, National Council for Research.
		Sayed Abdel Rahman Elagib	Director of the Council for Scientific and Technological Research, National Council for Research.
		Mr. Ibrahim Hassan Mohamad	Assistant Director, Council for Scientific and Technological Research, National Council for Research.
		Mr. T. Barlag	UNESCO expert for the establishment of the National Institute for Technology.
		Mr. Abdullatif Widaat Allah	Under-Secretary, Ministry of Industry.
		Mr. Taha El Rouby	Acting Chairman of the Board, Association of Industrialists (private sector) and member of the National Engineers Union.
SYRIA	Mr. M.T. Muntassir	Mr. M. El-Khash	General-Director, the Arab Centre for the Studies of Arid Zones and Dry Lands (ACSAD)
6-11 November 1977	Mr. M. Saad Mr. F.R. Hilmy Mr. A. Shuman	Dr. Jean Khoury	Director, ACSAD
		Dr. Ahmad Osman	Director, ACSAD
		Dr. Ismail El-Bagoury	Director, ACSAD
		Dr. Walid Al-Malik	
		Dr. Abdalla Sallouta	Under-Secretary, Ministry of Industry

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions or Offices represented
SYRIA (cont'd)		Dr. Shafik El-Safady	Under-Secretary; Ministry of Public Works
		Dr. Said Haffar	Head, Environment Committee, Supreme Council of Science, and Professor, College of Agriculture.
		Dr. Wathiq Shahid	Director, Scientific Studies and Research Centre.
		Mrs. Daad Taia	Supreme Council for Sciences
TUNISIA	Mr. M.T. Muntassir	Mr. Chadli Ttani	Director General, National Centre of Industrial Studies (Centre National d'Etudes Industrielles)
1-8 December 1977	Mr. M. Saad	Mr. Nagib Chaaban	Deputy Director, National Centre of Industrial Studies.
	Mr. M. Soubra	Mr. Nagtouf Sallagi	Deputy Director, National Centre of Industrial Studies.
	Mr. K.A. Sabet	Dr. Salah Bourgini	Directeur Adjoint, Technical Co-operation Department; Ministry of Foreign Affairs.
		Mr. Mohammed Atallah	Assistant Director, Technical Co-operation Department Ministry of Foreign Affairs.
		Mr. Mustafa M'timet	Assistant Director, Technical Co-operation Department Ministry of Foreign Affairs.
		Mr. Souai El Hechaichi	Director of Planning; Ministry of Transport and Communication.
		Mr. Sohair Masmoudi	Ministry of Planning
		Mr. Nagi Saeed	Director, National Centre of Leather and Leather Industries.
		Mr. Bechir El Mahgoub	Director of Higher Education; Ministry of National Education.
		Mr. Izzeldin Maalouf	Assistant Director of Scientific Research; Ministry of National Education.

Country and date	Members of UNECA Interagency Mission	Officials met	Institutions or Offices represented
TUNISIA (cont'd)		Mr. Mohamed Sta-M'Rad	Director General, National Institute of Agricultural Research (INRAT)
		Mr. Mustafa Lasram	Head Horticulture Laboratory (INRAT)
		Mr. Ali Khalafallah	Director of Industry; Ministry of National Economics.
UNITED ARAB EMIRATES (UAE)	Dr. M.S. Fayyad	Mr. Ahmad Khallewi	Director, Social Affairs & (Technical Co-operation); Ministry of Planning.
	Mr. R. Faruqi		
27-29 November 1977	Mr. Ismail Sian	Mr. El-Hag Ahmad Mohamad	Assistant to Director of Social Affairs; Ministry of Planning.
		Dr. Adil Shoukry	Director, Economic Section; Ministry of Foreign Affairs.
		Mr. Munsif Zafraan	Director of Projects, Abu Dhabi Fund for Arab Economic Development.
		Mr. Jean Battaillard	Member of the Board of Directors, Abu Dhabi Investment Authority.
		Mr. Aly Ismail El-Ambaby	Project Manager, Abu Dhabi Investment Authority.
		Mr. Farag Al Nazroui	Under-Secretary, Ministry of Finance & Industry
		3 other officials (engineers) working in the Department of Industry, Ministry of Finance and Industry.	

Country and date	Members of UNECWA Interagency Mission	Officials met	Institutions of Offices represented
UNITED ARAB EMIRATES (UAE)(cont'd)		Mr. Mohamed Salman	Under-Secretary; Ministry of Agriculture and Fisheries.
		Mr. Mohamed Abdel Aziz	Adviser; Ministry of Agriculture and Fisheries.
		Mr. Atif Suleiman	Adviser for Legal and Administrative Affairs. Abu Dhabi National Oil Co.
		Dr. Naman Al Jalili	Physical Planner, UNDP Mission on Housing, Building and Planning (Dubai)
		Dr. Alvaro Ortega	Building Adviser UNDP Mission on Housing, Building and Planning (Dubai)
YEMEN ARAB REPUBLIC (YAR) 6-7 December 1977	Dr. M.S. Fayyad Mr. S. Al-Ammari Mr. Ismail Sian	Mr. Mohamed Hussein Nizar	Director of Industrial Department; Ministry of Economy.
		Mr. Mohamad Saud El Jazali	Economic Adviser in Industrial Promotion Unit; Ministry of Economy.
		Dr. Ahmad Ragaye	Team Leader, Planning Experts, Central Planning Organization.
		Dr. Taha Ilyas	Senior Education Adviser & Programme Co-ordinator; Ministry of Education.
		Mr. Moqbel Ahmad	Acting Permanent Secretary and Director of Planning & Statistics Department; Ministry of Agriculture.
		Mr. Kamel Mansoor	Expert Team Leader from the World Bank, Ministry of Agriculture.
		Mr. Nega Orabi	Agriculture Expert from the World Bank, Ministry of Agriculture.
		Mr. Mahmood Saeed	Agriculture Planning Expert, Ministry of Agriculture
		Mr. Hussein Al Faqeeh	Director of Irrigation Department, Ministry of Agriculture.

Country and date	Members of UNDP/IA Interagency Mission	Officials met	Institutions or Offices represented
PEOPLE'S DEMOCRATIC REPUBLIC OF YEMEN (PDRY)	Mr. M.S. Fayyad	Mr. Khalid Hariri	Director of the Department of International and Arab Organizations; Ministry of Planning.
	Mr. R. Faruqi	Mr. Abdul Alim Abdul Jabbar	Member, Industrial Department; Ministry of Planning.
13-14 December 1977	Mr. S. Al-Ansari	Mr. Mohamed Ali Bassaoorn	Permanent Secretary; Ministry of Trade and Supplies.
		Mr. Mohamed Ahmed Bin Taher	Member of Planning and Statistics Department; Ministry of Labour and Civil Services.
		Dr. Mohamed Jaffer Zain	Rector of Aden University.
		Mr. Abdulleh Abadan	Permanent Secretary; Ministry of Industries.
		Mr. Omar Orabi	Head of Studies and Project Preparation Section, Investment Department; Ministry of Industries.
		Mr. Taha Shakir	Section Head for Project Implementation Section, Investment Department, Ministry of Industries.
		Mr. Salim Al Ansari	Section Head of Technical Production Department, Ministry of Industries.
		Mr. Abdur Rahman Badeeh	Deputy Permanent Secretary; Ministry of Agriculture.
		Mrs. Salwa-bin-Human	Director of Evaluation Section, Planning and Statistics Department; Ministry of Agriculture.
		Mr. Ghazi Ali Ahmad	Director, Department of Planning, Public Corporation for Contracting and Industrial Installation; Ministry of Construction.

AFFILIATIONS OF MEMBERS OF THE TWO MISSIONS

Name	Affiliation
Mr. S. Al-Amari	UNIDO
Dr. T. Al-Khudayri	ECWA
Mr. C. Baron	ILO
Mr. R. Faruqi	UNCTAD
Dr. M.S. Fayyad	ECWA
Mr. F.R. Hilmi	ECWA
Mr. A. Kecherid	WIPO
Dr. M.T. Muntassir	ALECSO
Mr. F. Pidgeon	ILO
Dr. Michael Saad	UNESCO
Mr. K.A. Sabet	FAO
Mr. A. Shuman	FAO
Mr. I. Siam	CAEU
Mr. M. Soubra	ECWA